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ABSTRACT

This report presents a description of the Title I Elementary and Secondary Education Act program in New York State. The report describes the evaluation of programs in reading, mathematics and bilingual education. The project participants were 150,000 Upstate New York children and 150,000 New York City children. Among the findings of the report are the following: the group means for Upstate and New York City children were found to be significantly different and positively related to pretest and posttest distribution in reading and mathematics skills after exposure to Title I services. Approximately 73 upstate and 8,000 New York City non-English or limited English speaking pupils showed improvement beyond their performance at the outset of the projects in English language fluency. About 12,000 bilingual students from both Upstate and New York City demonstrated an increase in their capacity to read English. Moreover, 1,000 Spanish-dominant students increased in their capacity to read Spanish. There were also gains in remedial reading and remedial mathematics for both Upstate and New York City children. (Author/AM)

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ELEMENTARY AND SECONDARY EDUCATION
ACT OF 1965 - TITLE I
P.L. 93-380

THE NEW YORK STATE ANNUAL EVALUATION REPORT

FOR 1974-75 FISCAL YEAR

SECTION II: ACHIEVEMENT SUMMARY

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INTRODUCTION

The entire 1974-75 Annual ESEA, Title I Report conforms to requirements set forth by the U. S. Office of Education by providing for an annual narrative and statistical summary of the Title I effort in New York State.[1/] The program descriptors report or Section I was submitted in the fall of 1975. Section II provides an overview of achievement in supplementary reading, mathematics, and English as a second language activities. The report also cites districts that conducted promising activities where achievement was especially noteworthy. Selected efforts where districts conducted studies of research related to project elements are reported. Additionally, the evaluation reports submitted by one large and one other local evaluation agency may be found in the appendices, as required by the directive.

The report was the result of permanent and temporary staff working in unison with George A. Cronk, Jr. who is the ESEA I evaluation program manager. The document was prepared in the Office of Elementary, Secondary and Continuing Education, Research and Planning for the Office of Educational Opportunity Programs.

1/"ESEA, Title I Program Information #341 DCE/PSB" in accordance with PL 89-10 as amended by PL 93-380, Part D, General Provisions, Section 142 (a) (3).

CHAPTER I
EXECUTIVE SUMMARY

The three priority areas designated for instruction were reading, mathematics, and bilingual education. The last area was subsequently interpreted to consist of (1) oral fluency and aural comprehension in English by speakers of other languages, (2) visual literacy in English reading and visual literacy in Spanish for Hispanic Americans. Superimposed across all projects employing norm referenced tests (so that comparable data leading to programwide inferences were derived) was the question: Did each treatment group demonstrate achievement beyond expectation (based upon the pupil's own past performances)? The local education agencies subjected the pretest scores to a regression equation that estimated where the target population might place at the posttest in the absence of Title I services. A comparison of the obtained posttests was made with the estimated posttests by means of an inferential statistic so that real differences would be detected. Where historical data did not exist, the difference between pretest scores and posttest scores was subjected to inferential analysis.

The scores of the 292,000 participants in the three priority areas[1/] were from samples with appropriate test data. However, generalizations to the total treatment groups have been avoided. Only scores of pupils who had a pretest and posttest were included in the district-prepared analyses subsequently aggregated by the State. Such data indicated that pupils in remedial treatments either moved closer to the average (more advantaged) pupil's performance or accelerated their rates of growth concurrently with participation in district designed ESEA, Title I projects.

1/Reading, mathematics and bilingual education - defined and described in Section I, a separate report.

.....The group means for over 1,300 Upstate and over 2,000 New York City prekindergarten disadvantaged youngsters were found to be significantly different (and positive in direction) between pretest and posttest distributions in reading and mathematics readiness.

.....Nearly 1,200 Upstate and 5,500 New York City kindergarten participants showed improvement in reading and mathematics skills after exposure to Title I services.

.....In English language fluency and aural comprehension, approximately 73 Upstate and 8,000 New York City non-English or limited English-speaking pupils demonstrated improvement beyond their performance at the outset of the projects.

.....About 12,000 bilingual participants from Upstate and New York City demonstrated an increase in their capacity to read English. Additionally, 1,000 Spanish-dominant participants increased in their capacity to read Spanish.

.....In remedial reading projects, approximately 64,000 Upstate and 35,000 New York City Title I participants closed the gap between themselves and the average achieving peers at a rate of over .3 months gain for each month of Title I treatment.

.....In remedial mathematics treatments, nearly 19,000 Upstate and 40,000 New York City pupils who previously learned at an average rate of half that of advantaged pupils achieved a 1.6-month gain for each month in ESEA, Title I supplementary services.

The interpretations of the findings do not permit evaluators to claim that the ESEA, Title I program in New York State was an unqualified success. For example, approximately 5,500 reading and mathematics participants did no better while participating in Title I treatments than they had done prior to intervention. It should be noted that there are features of the procedures

applied to the data in this report which could produce a tendency to overestimate the effectiveness of the categorically aided compensatory education programs. However, many experts feel that no one factor would be expected to produce positive findings of the strength observed and the possibility that all of such factors had combined in their most extreme form to produce such apparently favorable results.

Overall, the data indicated that in excess of 105,000 Upstate and 150,000 New York City educationally disadvantaged project participants who were consistently meeting failure in the basic skill areas had not only arrested the rate of deterioration but were diminishing the distance between themselves and the norm by which they were being judged. In other words, while participating in the regular classroom and in supplementary services, the 255,000 participants demonstrated the capacity to achieve at higher rates of growth than without the ESEA, Title I basic skills remedial activities. Districts, judiciously expending ESEA, Title I monies in New York State, again demonstrated that given supplementary resources, positive changes in pupil behavior in the basic skill areas (beyond the growth expected in the absence of funded projects for disadvantaged learners) can be brought about on a massive scale.

CHAPTER II

OVERVIEW

This section of the 1974-75 Annual ESEA, Title I Report focuses on the achievement attained by participants in compensatory activities. The major report was divided into two sections; namely, Section I - Program Descriptors and Section II - Achievement Summary. The remainder of this report will be concerned with the latter.

Background

The data are summative with reference to demonstrated changes in pupil behavior as assessed largely by standardized measures, usually collected from paper and pencil pupil-recorded responses. In addition to describing the procedures employed to summarize the reading, mathematics and bilingual education data, the report contains chapters on special studies pertinent to action research for the improvement of instruction for educationally disadvantaged pupils and other promising instructional treatments for which the achievement data indicate the activities are worth following to identify exemplary practices, to validate and disseminate.

Purpose of the Report

The achievement summary was prepared to provide decision makers at local, State and Federal levels with a source of information bearing directly on probably outcomes given compensatory efforts in the education of disadvantaged pupils. This report with the companion section on program descriptors fulfills the Federal mandate for an annual summary of ESEA, Title I funded activities.

The three priority areas designated for instruction were reading, mathematics, and bilingual education. Reading and math were remedial in nature while the bilingual consists of (1) oral fluency and aural comprehension in English by speakers of other languages, (2) visual literacy in English reading, and (3) visual literacy in Spanish for Spanish-speaking pupils. Mathematics data obtained from bilingual pupils of limited English-speaking ability are presented separately.

For purposes of obtaining comparable achievement data for which defensible conclusions might be drawn, districts were confined to reporting data from (1) cognitively oriented behavioral objectives, (2) comparable instruments that met requirements of empirically derived standardization, (3) analyses that involved statistical checks to reduce errors associated with measurement and (4) pupils who had a set of paired scores. These parameters, which were agreed upon before projects were funded, permitted the aggregation of similar data for certain statewide conclusions regarding the effectiveness of ESEA, Title I-funded compensatory activities.

Procedures

Each of the 796 projects included behavioral objectives, a schedule of data collection on specified measurement devices and a plan of data analysis. The summary of data in this report required a set of procedures that would encompass many varied objectives, tests, plans of data collection and analysis.

Objectives

District prepared behavioral objectives indicated the area of behavioral change (e.g., reading comprehension), the degree of change anticipated at the conclusion of the treatments (e.g., an increase of nine months in grade equivalent units), and the criterion measure for reference (e.g., the Metropolitan Achievement Reading Comprehension subtests). Where appropriate, the State superimposed the following question, (so that comparable data leading to programwide inferences using norm referenced tests could be examined): Did each treatment group in each priority area demonstrate achievement beyond expectation (based on past performance) when measured by a norm referenced achievement test? Some districts translated this question directly into a performance behavioral objective specific to a subject matter area.

Parameters of District Reported Data

A set of boundaries of what shall be summarized and reported is necessary given the many types of observations of behavior available to district evaluators. Measures that were standardized were permitted at the time each local ESEA, Title I application for grant was approved. The scores were usually transformed into grade equivalent units, standard or scaled score, or percentile ranks for reporting by districts to the State. An estimated group level of performance based upon the absence of ESEA, Title I intervention was requested of districts wherever reasonable. Conclusions allowable from district norm referenced data were limited to those that were logically connected to results of district conducted inferential statistical analysis. Where districts employed norm referenced tests, but too few pupils were available for a feasible inferential statistical analysis to be conducted, individual standard or scaled scores were reported. Where appropriate, mastery level criterion referenced tests were administered and the resultant data reported with reference to leveled behavioral objectives. In all cases, only the scores for pupils who had taken both a pretest and posttest were submitted. Given the mobility and chronic absenteeism peculiar to the target population in the larger metropolitan areas hosting ESEA Title I services, about 25 percent of the project participants are not reflected in the summary of achievement data.

The State prepared an index of objectives common to the several commercially prepared criterion referenced tests. Districts translated the selected commercially prepared objectives into the State's taxonomy, thereby permitting the aggregation of data across common objectives.

In spite of the hundreds of objectives submitted by districts, the State prepared a (1) master objective across most district generated-objectives dependent upon norm referenced measurement and a (2) taxonomy of criterion referenced objectives common, at least in part, to most commercially prepared criterion referenced tests. The objectives reported on in the report were confined to the priority areas of instruction discussed in Section I: Program Descriptors.

Instrumentation

A pupil's score taken from a norm referenced test (where test items were selected upon their ability to discriminate between pupils) permits evaluators to assess a pupil's achievement relative to other pupils in the original norming population. Where appropriate, districts were encouraged to select a reading measurement device from the Anchor Series, a set of devices endorsed by the United States Office of Education as meeting vigorous standardization criteria as well as yielding scores convertible to the 1970 Metropolitan Achievement Reading tests. The norm referenced measures in the ESEA, Title I program were taken from devices that met accepted conditions of reliability and validity.

Criterion referenced test items do not contrast pupil's relative placement, but rather yield information as to whether a specific performance objective is mastered. Usually there are several test items that are associated with a single objective. The focus with criterion referenced tests is on the achievement or mastery of a particular skill rather than a pupil's relative position on a test in reference to a norm. Criterion referenced instruments permit the pretest to serve as a diagnostic instrument for isolating skill deficiencies for each participant.

The information from such a device allows the teaching staff to prescribe treatments for identified deficiencies. Criterion referenced devices provide an identification of pupil needs and skill achievement as well as a diagnostic tool for instruction.

Remedial treatments of short duration and/or intensity (e.g., summer schools) typically are designed to address only a few behavioral objectives. Alternately, there are ESEA, Title I treatments designed to serve highly transient populations (e.g., neglected youth, delinquents, pregnant teenage girls) where there would be a limited exposure to the supplementary activities. Where Federal monies are distributed late in the regular school terms and a treatment may be extended to include new participants, the limited time allows only a narrow focus on selected skills. Similarly, since the concern in the criterion referenced measure is objective mastery in a hierarchy of skills (not a norming population), criterion referenced tests may be legitimately administered to groups of pupils not usually included in a norm referenced standardization group (e.g., Spanish language-dominant pupils with little or no command of English language reading skills). With criterion referenced materials, local education agencies may confine the content of a pretreatment interim, or post treatment assessment to the objectives under consideration.

The State reporting procedures had to be sufficiently comprehensive to accept data from different devices administered to differing subpopulations from treatments with a wide range of exposure to supplementary activities. The data reduction procedures, therefore, had to accommodate the wide range of factors associated with ESEA, Title I supplementary services.

Data Aggregation

Data were subjected to a series of editing operations in preparation for statewide summaries. Districts submitted the final section of the mailed information reports which contained the arrays of norm referenced and criterion referenced data. The data collection forms may be found in Appendix F.[1/] Data were first screened for completeness, reasonableness among possible acceptable responses by data unit (kind), and reasonableness within expected limits (amount or degree). The surviving data were prepared in a machine readible form. The data were then segregated into the following subject matter objective based categories: Basic skills Cognitive Readiness, Reading, Mathematics, and Oral/Aural English language facility.

Within the subject matter areas the data were separated as to whether norm referenced or criterion referenced measures were administered. Following the sort by instrument type, the data for Spanish-dominant participants whose facility in English was limited were segregated for separate analysis. Additionally, norm referenced data from New York City were treated separately. Further groupings were obtained by separating data into pre-kindergarten and kindergarten, and the grade intervals one to three, four to six, seven to nine and ten to twelve. The group data were also sorted as to the score type reported.

Methods of Analysis

Norm referenced group data were analyzed for true differences between two distributions (pretest to posttest or predicted posttest to obtained post test) as determined by the probability levels associated with the statistics. For those groups that demonstrated achievement (at the predetermined level of confidence) the means were averaged (by weighted means) to obtain a mean that represented accomplishment in that subject

1/Or are on file in the Bureau of School and Categorical Programs Evaluation.

matter area for a specific grade interval. Where norm referenced data were confounded by potential regression to the mean effects they were not included in the major aggregations. The summaries for grouped norm referenced data were developed for each score type reported. The final operation for the main portion of this report involved reducing the rates of change in behavior to one common base (growth per month) for the comparison of achievement with and without ESEA, Title I activities where appropriate. Other analysis involved the segregation of treatments according to the months elapsing between pretest and posttest administrations.

Criterion referenced group data were tabulated and summarized for each grade interval and each objective at each instructional level. The grade interval data and instructional level data were combined for this report so that inferences might be drawn as to the most frequently selected objectives and the overall achievement of these objectives. While data reduction concealed considerable information (e.g., What objectives at what levels do sixth grade reading participants typically fail prior to treatment?), the summarized data revealed the focus of the supplementary services and the accomplishments of the disadvantaged pupils receiving the services.

Limitations

The several procedures for preparing the achievement summary had to be sufficiently sound to yield defensible findings while still being flexible enough to accomodate various objectives, various measurement devices, different subpopulations, various score types, and several different data analysis techniques. Furthermore, the reduction of data for a summary tends to conceal specific affects at particular grade levels in a given subject matter area. Data were deleted or segregated when it was determined that an unauthorized change in the implementation

of a district evaluation plan might have influenced the findings. The method of analysis used most widely with norm referenced data did not account for pretreatment rate or performance for pupils who participated in prior years of Title I activities. The impact of the reported treatments for such pupils would be biased toward showing lower than expected achievement gains.

It should be noted that there are features of the procedures applied to the data in this report which could also produce a tendency to overestimate the effectiveness of the categorically aided compensatory education programs. However, many experts feel that no one factor would be expected to produce positive findings of the strength observed, and the possibility that all such factors had combined in their most extreme form to produce such apparently favorable results (where none had really occurred) seems very remote.

While data were summarized and are reported here both for successful and unsuccessful groups of participants, the data surviving the several rigorous procedures of aggregation indicate that educationally disadvantaged project participants were diminishing the distance between themselves and the norms by which they were being judged.

CHAPTER III

COGNITIVELY ORIENTED READINESS

Districts developed objectives that sought improved prereading or pre-mathematics skills for pupils of the prekindergarten and/or kindergarten age span. Measurement devices, developed to assess behavior in the cognitive area for this age span (4-6) often measure reading readiness or mathematics readiness skills simultaneously (e.g., left-to-right perceptions are necessary for following English language print and the initial steps of understanding the number line continuum). The outcome behaviors, therefore, are not discrete to one subject matter area and are reported as general cognitively oriented readiness achievement.[1/]

There were several difficulties associated with analyzing the data. Some of the problems were: (1) Since many different measurement devices were used, the data were not always comparable. (2) The devices were administered with various months of treatment in between and did not define an exact length of treatment in months elapsed. (3) Raw scores were the units of measure most frequently used requiring the SEA to make conversions to normalized scores (an opportunity for error). (4) The devices often were mastery-related, rather than possessing the accepted standards of item discrimination. (5) Scores of pupils possessing bilingual backgrounds involving limited English language ability in large cities were sometimes averaged with English language-dominant participants. (6) In the absence of control groups, reported growth may be a function of maturation effects or other effects not directly attributable to school or ESEA, Title I efforts. (7) Some devices require teacher ratings -- a method that suffers from problems of interrater reliability.

1/Cognitive readiness is intentionally vague as it applies to prekindergarten and kindergarten pupils skills here. The assumption was made that the several devices sampled equivalent behaviors (content-oriented) albeit in various ways, prior to aggregating the data from several projects.

Prekindergarten

Table 1 contains a summary of the prekindergarten achievement reported in percentiles. The means from Upstate participants indicated improved reading and mathematics readiness. The group means for 1,327 tested participants (of the 1,756 treated) showed an increase of at least five percentile points between pretest and posttest administrations of the prereading devices. Sixty Upstate prekindergarten pupils were treated to improve mathematics readiness skills, and the average of the 56 participants tested was an increase in posttest percentile rank by five percentile points or more.

Table 1

Prekindergarten Achievement in Percentile Units

	Number Treated	Number Tested	Pretest Mean	Posttest Mean
READING:				
Upstate	1,756	1,327	25.6	54.3
New York City	1,495	1,198	30.5	62.0
MATHEMATICS:				
Upstate	60	56	40.0	91.0
New York City	997	843	41.5	65.1

The prekindergarten reading treatments in New York City met with similar success. Of the 1,495 treated prekindergarten pupils, the group means of 1,198 tested participants showed an improvement in reading readiness ($p \leq .05$). Likewise, the group means for the 843 tested participants in the prematheматics treatments also indicated a gain in mean percentile rank ($p \leq .05$). Although these treatments were of varying duration, none was longer than 8 months. An increase of at least five percentile points is generally necessary to achieve more than 8 months growth in grade equivalent units, and these prekindergarten groups gained more than five percentile points.

Kindergarten

Several measurement devices purport to assess cognitive skills in reading and mathematics at the kindergarten level. There were group means for 1,229 upstate pupils and 5,483 New York City participants (among treated groups totaling 1,389 and 6,674 respectively) that had been tested on the Test of Basic Experiences, Metropolitan Readiness Test, the Stanford Early School Achievement Test, the Boehm Test of Basic Concepts or one of several other less frequently selected devices. Weighted means of several score types from the group pretests and posttests were converted to percentiles.

Table 2 contains the results of the aggregated district data. The pretest percentile mean for 1,057 upstate kindergarteners in reading was 26.4. Following Title I treatment the same pupils attained a percentile rank of 57.6. The 172 kindergarten pupils from Upstate districts treated in mathematics showed an even greater improvement, increasing from a pretest average percentile of 27.2 to a posttest rank of 71.0. The increase in percentile ranks for reading and mathematics brought these Upstate participants beyond the 50th percentile to a position above average for kindergarten pupils.

Table 2

Kindergarten Achievement in Percentile Ranks

	Number Treated	Number Tested	Pretest Mean	Posttest Mean
READING:				
Upstate	1,216	1,057	26.4	57.6
New York City	5,558	4,466	14.4	45.4
MATHEMATICS:				
Upstate	173	172	27.2	71.0
New York City	1,116	1,017	13.3	42.8

The New York City kindergarten target population also showed an upward trend in its educational growth. In reading, the participants increased a total of 31 percentile points from a pretreatment percentile mean rank of 14.4 to a posttreatment percentile mean of 45.4. Kindergarten pupils in the New York City mathematics treatments achieved a posttest percentile rank of 42.8, having entered the Title I program at a mean rank of 13.3. This movement of the target population toward the 50th percentile rank was quite encouraging since it indicates that the participants' educational disadvantagement has been arrested at an early age.

CHAPTER IV

BILINGUAL PUPIL ENGLISH LANGUAGE FACILITY

Bilingual education, as funded within the ESEA, Title I program was confined to (1) oral fluency and aural comprehension in English by speakers of other languages, (2) visual literacy in English reading, and (3) visual literacy in Spanish for Spanish-speaking pupils. Reading in English and/or Spanish is presented in the chapter entitled "Reading Achievement" and mathematics data elicited from bilingual participants is presented in the chapter entitled "Mathematics Achievement." The treatments that dealt mainly with English as a second language sought to improve listening or auditory recognition and speaking or encoding speech in English-supported increased language facility.

Among the project participants receiving an English as a Second Language (ESL) treatment, treated pupils were assessed for an improved ability to manipulate the symbols in the English language.[1/] Most ESL, ESEA, Title I participants were Spanish language-dominant and were found largely in New York City. The Oral Language Proficiency Scale (a four-factor scale involving comprehension, structure and syntax, vocabulary, and pronunciation) employing six scalar intervals (from low achievement to high achievement) and leading to a composite score (sum of subtests divided by four) was administered in most New York City projects. The Upstate ESL participants were tested with the aural recognition subtest of the Stanford Achievement Test, the Peabody Picture Vocabulary Test, and the Michigan Oral Language Scale. Since there were a variety of devices and because some of the devices required the use of continuous data and others discrete data, a concise summary of achievement in terms of grade equivalent units was not feasible. Consequently, each district was requested to test the difference between means where parametric statistics applied or to select an appropriate nonparametric statistic

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1/ In the absence of control groups, the improvement cannot safely be attributed only to ESEA, Title I activities.

(usually involving a chi-square distribution) with discrete data.[1] The application of inferential statistical techniques was implemented to determine whether a true difference existed between the two means or proportions, and the .05 level of confidence was arbitrarily set as the standard.

Data in table 3 reveal the performance of upstate and New York City ESL pupils in long duration treatments, that is, ESEA, Title I activities lasting more than three months.

Table 3

Achievement in English Language Facility

	Treatment Group	Tested Participants	Achieved Objective[2]
PREKINDERGARTEN:			
Upstate	11	11	yes
New York City	0	0	
KINDERGARTEN:			
Upstate	17	17	
New York City	1,179	984	yes
GRADES 1-3:			
Upstate	7	7	yes
Upstate	32	32	no
New York City	5,172	3,953	yes
GRADES 4-6:			
Upstate	6	6	yes
New York City	2,971	1,690	yes
GRADES 7-9:			
Upstate	0	0	
New York City	1,851	1,263	yes
TOTALS:			
Upstate	73	73	
New York City	11,173	7,890	
Combined Total:	11,246	7,963	

1/With paired scores, some districts used statistical tests to determine whether the difference between pretests and posttests was different from zero.

2/The expression "achieved objective" may be interpreted to mean that a true difference ($p \leq .05$) was detected between the pretest distribution and the posttest distribution.

An improvement in oral facility was detected for the group means of 7,890 of the New York City tested participants. Although the Upstate participants described in table 3 comprised less than 1 percent of the English language facility target population, Upstate treatments were not reported to be as successful as were treatments for the New York City pupils. However, this may be an artifact due to the small numbers involved.

An additional 241 pupils were assessed for growth in recognition of spoken English as measured by the Stanford Achievement Auditory (listening) subtest. The data in table 4 were from long duration (more than 3 months) treatments in New York City.

Table 4

English as a Second Language
(Auditory Recognition Achievement)

Grade Interval	Participants Treated	Participants Tested	Achieved Objectives
1-3	208	200	yes
4-6	31	20	yes
7-9	32	21	yes
Total:	271	241	

Among the 241 participants assessed for improved English listening and recognition abilities, the actual differences between pretest and posttest total raw score means indicated that the objective was met.

Overall, the group means for over 8,000 participants in English as a Second Language treatments indicated greater proficiency in oral facility and aural comprehension in the English Language at the conclusion of the effort than at the outset of the supplementary activities. While improved performance cannot be attributed solely to ESEA, Title I services, the bilingual pupils demonstrated a greater facility in speaking and understanding spoken English after participation in Title I treatments.

CHAPTER V

READING ACHIEVEMENT

Reading achievement data were collected for Title I participants on two differing types of measures. Scores collected on norm referenced devices permitted comparisons of treatment group means to the norming population. Since Title I participants generally were in the lowest tail of a grade level distribution, the goal of remedial reading efforts was to raise the group upward toward the midpoint (50th percentile) of the distribution. Some treatments were not easily assessed by norm referenced devices since norm referenced devices sample a wide variety of content. Where districts confined the treatments to a small slice of content, criterion referenced devices were administered.

Pupils participating in ESEA, Title I projects received supplementary treatments in remedial reading for varying lengths of time across the school year. Different commercially prepared standardized devices were administered before and after the treatments in different districts. Most data for grades three and above were reported in grade equivalent units. Since different time periods elapsed between pretest and posttest administrations, all grade equivalent scores were translated into the target groups' rates of gain per month. The data were analyzed as a comparison between pupil achievement prior to Title I treatment intervention period between testings.[1/] The pupil's past performance becomes his own "matched" control paired performance with this scheme.[2/]

1/ This method does not account for the pretreatment rate of inflation by pupils who participated in prior years of treatment. The impact of the reported treatments is slightly depressed by such participants.

2/ Actually, the local education agencies use the rates of gain to predict a posttest mean in the absence of treatment, compare the obtained mean at the end of the treatment, and test the differences via a correlated t-ratio or analysis of variance statistic.

Results from Norm Referenced Data

The data in tables 5 and 6 reveal that the means for over 63,000 Upstate public and nonpublic school tested participants in treatments lasting over 3 months indicated achievement ranging from .84 to 1.76 months growth for each month of participation in ESEA, Title I projects.

The rates of gain in grade equivalent units for second grade pupils were derived by the State from pretest and posttest means submitted by local districts. No "expectation" without ESEA, Title I was computed. The group means for the 5,371 upstate second graders tested (of 6,619 participants treated) indicated a growth of 1.36 months for every month of Title I treatment. This rate is greater than the established rate of the average learners, one month growth for each month of instruction. The group means for 11,982 tested second grade students, (among 15,038 treated), from New York City school districts indicated a lower but encouraging rate of gain, 1.18 months per month of treatment. The grade equivalent rates prior to Title I intervention and during intervention are displayed in illustrations 1 and 2 which are located a few pages further on in the text.

Table 5

Upstate Nonpublic School Reading Achievement

Grade Interval	Participants		Monthly Rate Before Treatment	Monthly Rate During Treatment
	Treated	Tested		
1-3	2,500	2,220	.51	1.17
4-6	3,039	2,663	.58	1.30
7-9	726	673	.63	1.64
10-12	86	96	.46	.84
TOTAL	6,351	5,642	.56	1.28

The rates for participant groups above, measured in grade equivalent units, indicate that the successful nonpublic pupils improved at a rate greater than that of the average learner (i.e., 1 month's growth for each month of instruction). The combined group mean indicates that these tested groups were coming closer to their more advantaged peers at a rate of nearly .3 month per month of ESEA, Title I treatment.

The success of the 75,000 upstate and 64,000 New York City long treatment duration (more than 3 months) students as measured by norm referenced reading achievement tests indicated that most districts were not able to arrest the academic deterioration of the learners but also were able to help these elementary and secondary target populations catch up to their more advantaged peers.

Table 6

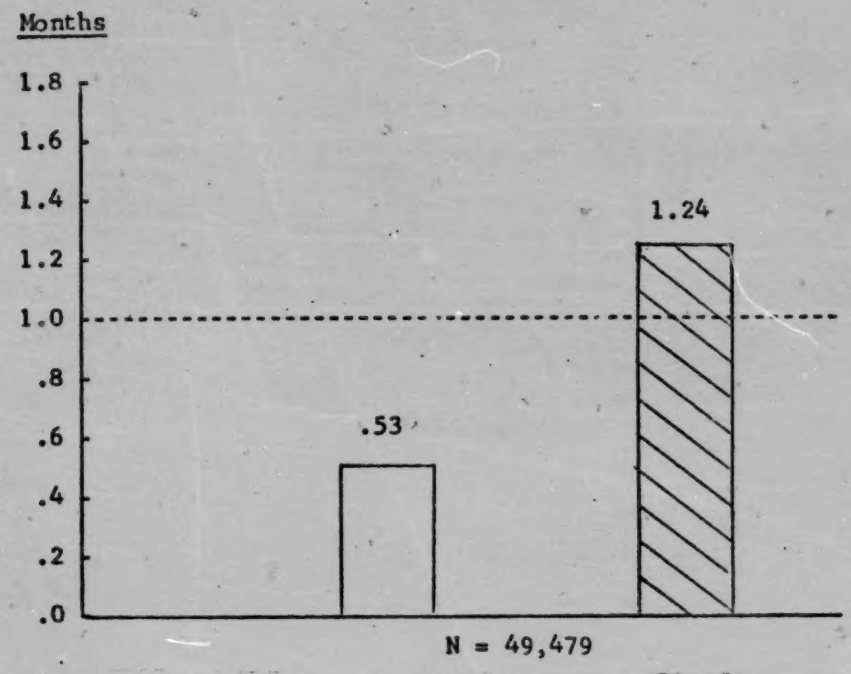
Upstate Public School Reading Achievement

Grade Interval	Participants		Monthly Rate Before Treatment	Monthly Rate During Treatment
	Treated	Tested		
1-3	18,308	16,619	.55	1.24
4-6	31,186	27,977	.51	1.24
7-9	13,087	11,877	.52	1.59
10-12	1,720	1,459	.66	1.76
Total	64,301	57,932	.53	1.32

Like the nonpublic upstate data, the change in public Upstate participant group means, measured in grade equivalent units, indicated success. The combined group mean showed an improvement of one third above the month-for-month achievement needed to maintain the normal rate of growth.

Illustration 1

Upstate Elementary Reading Rate of Gain



LEGEND: All Rates In Months of Gain Per Month of Treatment

Prior to Treatment

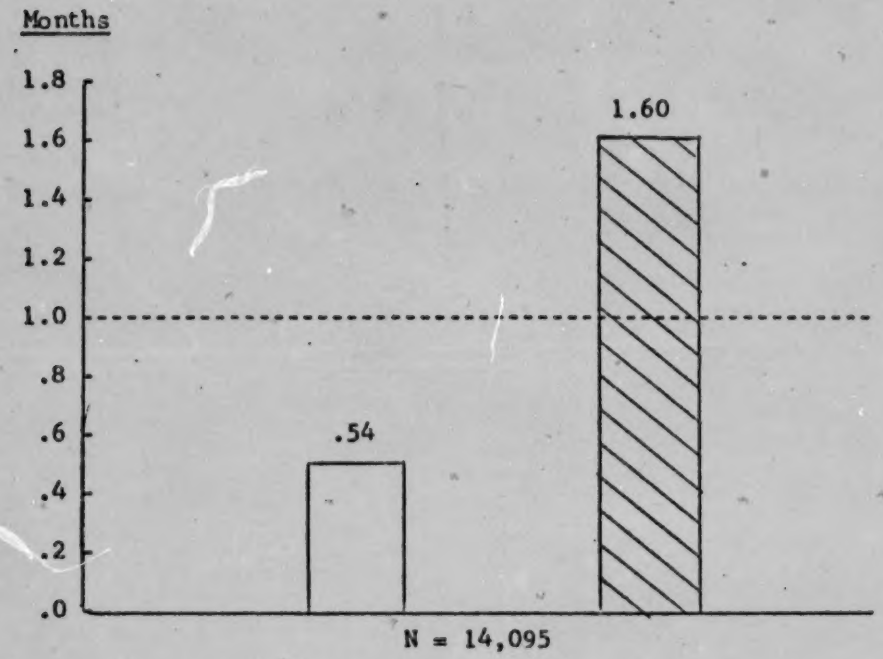
During Treatment

-------- Rate of Average Learner

Illustration 1 displays the comparison between the pretreatment rate of gain, .53, and the posttreatment growth rate, 1.24 for Upstate elementary reading groups. The graph also shows that the mean rate of gain upon the conclusion of Title I treatment was .24 months greater than the normal rate.

Illustration 2

Upstate Secondary Reading Rate of Gain



LEGEND: All Rates In Months Of Gain Per Month of Treatment

Prior to Treatment

During Treatment

-------- Rate of Average Learner

The average rate of the Upstate secondary pupil groups showed an even greater improvement, as displayed in illustration 2, than the elementary rate indicated. The secondary pupils' mean rate of gain indicated that the Title I participant groups were catching up with their nondisadvantaged peers at a rate of .6 months for each month of treatment.

As indicated in tables 7 and 8, the mean achievement rates for over 35,000 New York City public and nonpublic pupils participating in total reading treatments lasting more than 3 months ranged from 1.06 to 1.84 months growth for each month of ESEA, Title I treatment. The comparison of rates for elementary and secondary pupils prior to Title I treatment and during treatment are displayed in illustrations 3 and 4.

Table 7

New York City Nonpublic Reading Achievement

Grade Interval	Participants		Monthly Rate Before Treatment	Monthly Rate During Treatment
	Treated	Tested		
1-3	3,518	2,922	.31	1.06
4-6	8,433	7,325	.44	1.06
7-9	3,603	3,038	.41	1.31
10-12	495	372	.64	1.63
Total	16,049	13,657	.41	1.13

The nonpublic school pupils in New York City projects ceased falling behind at a rate of .6 month for each month of regular classroom activity and achieved at a rate in excess of 1 month for each month of Title I supplementary services.

Table 8

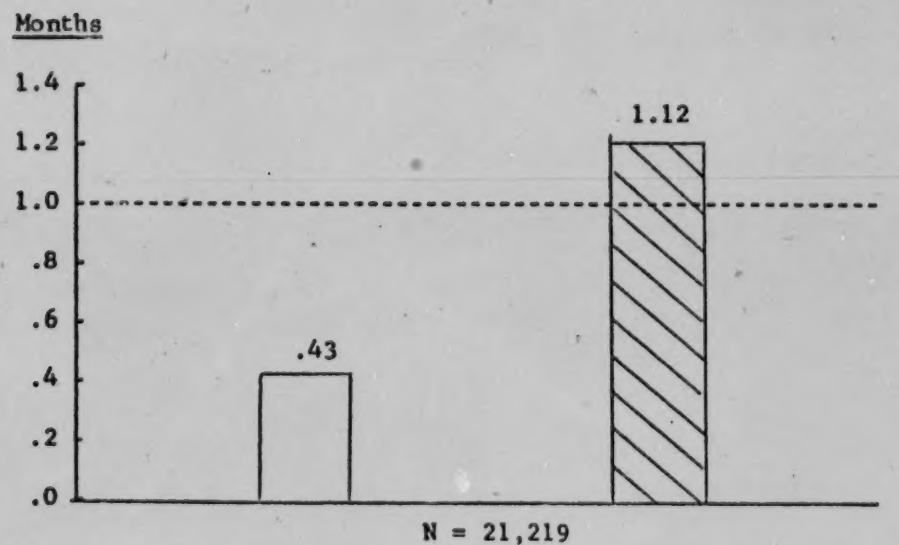
New York City Public Reading Achievement
in Grade Equivalent Units

Grade Interval	Participants		Monthly Rate Before Treatment	Monthly Rate During Treatment
	Treated	Tested		
1-3	3,037	2,285	.30	1.15
4-6	10,962	8,687	.50	1.19
7-9	5,381	4,334	.63	1.56
10-12	7,802	6,807	.71	1.84
Total	27,182	22,113	.57	1.46

The target population achieved at a rate of slightly over 1/2 month for each month of regular classroom experiences. During the ESEA, Title I treatments the target population achieved nearly $1\frac{1}{2}$ in grade equivalent units.

Illustration 3

New York City Elementary Reading Rate of Gain



N = 21,219

LEGEND: All Rates in Months of Gain Per Month of Treatment

Prior to Treatment

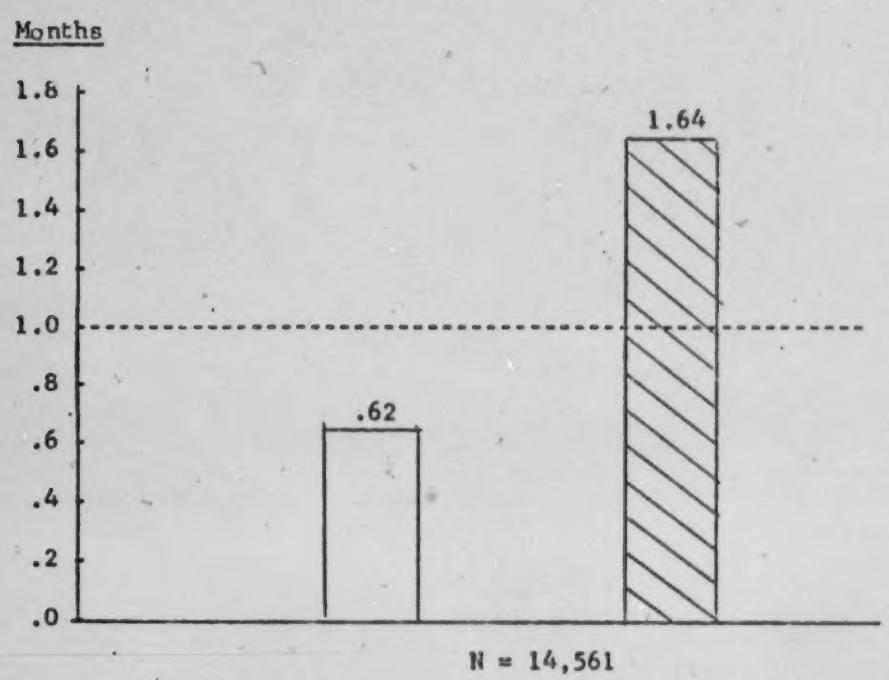
During Treatment

-------- Rate of Average Learner

The bars in illustration 3 indicate that New York City elementary pupils who achieved at a rate of .4 month for each month of classroom activities prior to the intervention of ESEA, Title I had ceased falling further behind and had begun to reduce the gap slightly between themselves and their more advantaged peers.

Illustration 4

New York City Secondary Reading Rate of Gain



N = 14,561

LEGEND: All Rates in Months of Gain Per Month of Treatment

Prior to Treatment

During Treatment

-------- Rate of Average Learner

Additional norm referenced reading achievement data collected on the New York Citywide Test may be found in Appendix A.[1/] Such data were segregated from the findings presented here since they failed to meet the measurement criteria stated in Chapter II.

[1/] Or on file in the Bureau of School and Categorical Programs Evaluation.

The data in tables 9 and 10 indicate that the district means in percentile ranks taken from about 6,900 Upstate participants and about 16,000 New York City pupils demonstrated achievement beyond expectation. The larger numbers found in grades one through three reported in percentile ranks were expected since the participants' scores reflect early reading skills and are not easily interpreted with the historical rate of growth analysis involving grade equivalent units. The groups of participants advanced at least five percentile points closer to the median (50th percentile) and some ranged up to 24 percentile points closer while participating in ESEA, Title I remedial reading activities.

Table 9

Upstate Reading Achievement In Percentile Ranks

Grade Interval	Participants		Percentile Rank before Title I	Percentile Rank After Title I
	Treated	Tested		
1-3	6,435	5,581	28.7	53.0
4-6	623	414	24.4	42.3
7-9	1,028	700	17.9	25.2
10-12	378	271	14.4	19.5
Total	8,464	6,966		

The Upstate reading achievement data reported in mean percentile ranks indicated an impressive improvement, especially in grades one through three. The 5,500 public and nonpublic pupils in the early grades had attained a position slightly above the midpoint of the norming population and by definition had ceased to be disadvantaged.

Table 10

New York City Reading Achievement In Percentile Rank

Grade Interval	Participants		Percentile Rank before Title I	Percentile Rank after Title I
	Treated	Tested		
1-3	18,932	14,546	28.60	59.46
4-6	37	35	25.97	69.03
7-9	16	16	49.75	77.38
10-12	2,429	1,786	35.55	41.60
Total	21,414	16,383		

The mean percentile rank of the New York City public and nonpublic reading participants at the conclusion of the treatments indicated that the target population was no longer eligible for services. The projects appeared most successful at the later elementary level where an improvement of 43 percentile points was revealed.

Reading Achievement in English by Bilingual Participants

School districts elected to assess facility in reading English by administering a typical norm referenced reading achievement test such as the Metropolitan Achievement Test or a device from the Cooperative Inter-American Achievement Test series. Since the typical English-language reading tests were not normed on non-English or limited English-speaking pupils, cautious interpretations should prevail when reviewing the results. Furthermore, some districts employing this approach administered an age/grade level of the device much different (lower) from the actual age of the participants. The data from these 1,117 pupils were not included in the foregoing analysis. The assumption made when employing a reading test designed for skill level assessment for English reading facility by bilingual pupils is that a measure of translation is operating rather than a leveled skill inherent in reading. This phenomenon becomes especially apparent when scores from the word recognition or vocabulary subtests are compared with scores from the comprehension subtest in the same device. However, the districts reported the combined (averaged) subtest scores as a composite reading score which may have operated to conceal part of the impact of the improved translation capacities.

Data for bilingual reading achievement were reported as pretest and posttest comparisons in percentile ranks. As with all district data, inferential statistical analyses between pretest and posttest distributions were conducted to determine whether meaningful differences were detected. Table 11 displays the Upstate summary of bilingual pupils' ability to read English in prekindergarten through grade twelve across varying treatment periods.

Table 11

Upstate Bilingual Participants' Norm Referenced English Reading Achievement

Grade Interval	Participants		Met Objective
	Treated	Tested	
Pre-K	49	38	yes
K	39	33	yes
K	98	86	no
1-3	364	225	yes
4-6	274	227	yes
4-6	230	120	no
7-9	453	250	yes
7-9	25	14	no
10-12	60	33	no
10-12	308	105	yes
Total	1,900	878 - met groups' objectives 253 - failed groups' objectives	

The average reading translation capacity of 78 percent of the tested participants improved significantly as evidenced by an increase of at least five percentile points between pretest and posttest rank.

Table 12 displays the summary of achievement of New York City bilingual pupils tested in reading on English language achievement tests.

Table 12

New York City Bilingual Participants' Norm Referenced
English Reading Achievement

Grade Interval	Participants		Met Objectives
	Treated	Tested	
K	461	411	yes
1-3	1,374	1,174	yes
4-6	969	815	yes
4-6	3	3	no
7-9	406	337	yes
7-9	24	24	no
Total	3,237	2,737 - met groups' objectives 27 - failed groups' objectives	

Group means for 99 percent of the New York City bilingual participants tested and reported indicated improved English reading skills after Title I treatment.

The Cooperative Inter-American (CIA) Series Test of Reading was administered to 193 Upstate and 8,870 New York City participants as a pretest and posttest to measure English reading ability. Since raw score means were reported (accompanied by appropriate inferential statistical analyses), only success or failure of the groups could be ascertained. Tables 13 and 14 summarize the achievement of bilingual participants on the English reading subtest of the CIA.

Table 13

Upstate Reading Achievement in English For Bilingual Pupils Tested With The Cooperative Inter American Series

Grade Interval	Participants		Met Objective
	Treated	Tested	
1-3	158	158	yes
4-6	49	35	yes
Total	207	193	

The group means for 193 Upstate bilingual pupils tested with the CIA test of reading showed an improved ability to reading English.

Table 14

New York City Reading Achievement in English for Bilingual Pupils Tested With the Cooperative Inter-American Series

Grade Interval	Participants		Met Objective
	Treated	Tested	
1-3	125	108	no
1-3	3,787	3,222	yes
4-6	239	238	no
4-6	3,512	2,518	yes
7-9	155	110	no
7-9	2,409	1,865	yes
10-12	30	18	no
10-12	703	661	yes
Total	11,050	8,266 - met groups' objectives 474 - failed groups' objectives	

Group means for 94 percent of the New York City bilingual pupils tested with the CIA Test of Reading showed a gain in English reading skills between pretest and posttest administrations.

In Upstate and New York City districts combined, the group means for 12,074 of the 12,828 total tested bilingual participants indicated an increase in the ability to read the English language after Title I treatments.

Reading Achievement in Spanish by Bilingual Participants

In situations where (1) districts attempted to preserve the Spanish bilingualism of the target population and/or (2) general academic development of the participants was to be continued as the youngsters acquired facility in the English language, measures of achievement were assessed in reading Spanish.

A correlated t-ratio or repeated measures analysis of variance was applied to the data to determine whether a true difference existed between the pretest and posttest distributions of scores.

The data in tables 15 and 16 were collected on the Cooperative Inter-American Prueba de Lectura which samples Spanish vocabulary and comprehension abilities. All raw scores summarized below were collected from districts conducting Spanish reading treatments spanning more than 3 months.

Table 15

Upstate Reading Achievement in Spanish

Grade Interval	Participants		Met Objective
	Treated	Tested	
Pre-K	49	31	yes
K	55	35	yes
1-3	280	191	yes
1-3	80	10	no
4-6	197	161	yes
4-6	92	18	no
7-9	102	93	yes
7-9	129	59	no
10-12	107	81	yes
10-12	8	4	no
Total	1,099	592 - met groups' objectives 91 - failed groups' objectives	

Among the participants tested for improvement in reading Spanish (62 percent of those treated), the group means for 592 bilingual pupils indicated that the objectives were met.

Table 16

New York City Reading Achievement in Spanish

Grade Interval	Participants		Met Objective
	Treated	Tested	
4-6	54	47	no
4-6	492	331	yes
7-9	262	88	yes
Total	808	419 - met groups' objectives 47 - failed groups' objectives	

A true difference between pretest and posttest group means on the CIA Test of Spanish Reading indicated that groups of pupils representing 89 percent of the bilingual New York City participants tested successfully achieved the Spanish reading skills objectives.

Norm Referenced Reading Achievement Summary

The means taken from approximately 75,000 Upstate and 64,000 New York City, ESEA Title I participants without complications of bilingualism indicated that project objectives had been widely met. The successful participants not only had ceased falling further behind, but were also catching up to their more advantaged peers as indicated by norm referenced achievement test data. Group means obtained from 1,071 Upstate and 11,003 New York City tested bilingual pupils steadily advanced in reading English while over 592 upstate and 419 New York City participants improved in the ability to read Spanish.

Criterion Referenced Test Data: Reading

The state taxonomy of reading objective topics separated the objectives into five categories: phonetic analysis, structural analysis, vocabulary, comprehension and study skills. The data for each category are presented in tables 17, 18, 19, 20 and 21, respectively. An illustration of a typical commercially prepared objective precedes each table so that the tabled data may be related to one of the behaviors sought by the measure. For this report, the data are aggregated across all instructional levels. Under the caption "Failed Pretest," "number" (N) refers to only the pupils who failed the pretest and corresponds to the percentage of participants who failed the pretest based upon the number of pupils who were tested for mastery of a particular objective. The number (N) under the caption "Mastered on Posttest" refers to those pupils who, having failed the objective at pretest, demonstrated mastery at the time of posttesting. Percent, in the latter case, refers to the pupils demonstrating mastery at the posttest divided by the number of pupils failing the objective at the pretest. A review of the percent mastered on posttest column may provide districts with an idea of what might be accomplished (with a high probability) in short duration treatments, while the percent column under "Failed Pretest" would provide a diagnostic or needs assessment profile. Districts having learners with reading deficiencies similar to those in the table might select objectives where a high percentage (over 60) demonstrated mastery on the posttest and thereby increase the likelihood of achieving certain objectives across treatments of short duration.

Phonetic analysis, the rudimentary skills for some methodologies required for reading the printed word include a code-breaking capacity. Phonetic analysis frequently relates a spoken sound to a letter or letter combination.

Objective No. 2105[1] Consonant Blends Level: 1[2]

Given a picture, the word for which has the initial blend missing, you will identify from a list, the correct initial blend to complete the word:

/ bl / .[3]

System: Individualized Criterion Referenced Testing[4]

Publisher: Educational Development Corporation

The heaviest emphasis in phonetic analysis objectives was placed on vowels involving more than one letter. Single letter vowels, consonants and blends also provided considerable difficulty for the target population. The greatest single percentage of success of the objectives attempted was attained with initial consonants, as shown in table 17, while the largest number of successful participants addressed the multi-letter vowels (ou, ie, ei, ea, and so forth). The percentage of success ranged from 59 to 79, the highest range of all five areas.

Table 17

Phonetic Analysis

Objective Topic	Failed Pretest		Failed Posttest		Failed Pretest But Mastered On Posttest	
	N	%	N	%	N	%
Letter Recognition	1,684	52	463	27	1,221	73
Initial Consonants	1,585	56	339	21	1,246	79
Medial Consonants	452	59	160	35	292	65
Final Consonants and Blends	2,915	70	1,166	40	1,749	60
Consonant Blends	2,433	64	737	30	1,696	70
Vowels: Single Letters	2,982	69	1,163	39	1,819	61
Vowels: More than One Letter	3,951	64	1,624	41	2,327	59
Consonant Digraphs	2,472	63	762	31	1,710	69
Silent Consonants, Hard and Soft C and G	985	66	266	27	719	73
Rhyming Words	841	59	242	29	599	71

1/State Index number

2/Level as used in this context means: Test manufacturers placed criterion referenced objectives in an ascending order of difficulty for each skill area within a content domain. An empirical order of difficulty was derived and the objectives were labeled to correspond to approximate grade placements for instructional purposes. Disadvantaged learners found in grade six often may be found working toward comprehension or computation objectives at instructional or performance rank three. Such sixth grade pupils would be working toward objectives normally pursued by third grade pupils.

3/Verbatim from publisher's materials

4/Publisher's program identifier

Structural analysis, the knowledge or word composition and elementary sentence structure require skills of analysis so that common elements (e.g., prefixes) when encountered may be detected and unfamiliar words decoded.

Objective No. 2203 Endings Level: 6

Identify the correct plural form of a word (irregular, y word, or s word)

System: Individual Pupil Monitoring System

Publisher: Houghton Mifflin

Reading skills associated with syllabication (the joining or dividing of words into syllables) so that unfamiliar words may be decoded, accounted for the greatest number of remedial participants. Word endings apparently gave the target population considerable difficulty according to the data in table 18. Punctuation skills were the least frequently failed at the pretest, and the least frequently mastered at the posttest as a percentage of those attempting to achieve such skills. Sixty seven (67) percent of the participants attempting the analysis of compound words were successful at the time of posttest administration.

Table 18

Structural Analysis

Objective Topic	Failed Pretest		Failed Posttest		Failed Pretest But Mastered On Posttest	
	N	%	N	%	N	%
Compound Words	1,759	60	576	33	1,183	67
Contractions	909	59	384	42	525	58
Endings	1,955	66	849	43	1,106	57
Prefixes, Suffixes, Affixes	1,725	65	697	40	1,028	60
Syllables	2,133	63	882	46	1,251	54
Prepositions, Phrases	270	74	115	43	155	57
Sentence Structure	345	52	178	52	167	48
Punctuation	251	52	135	54	116	46

Vocabulary, including the recognition of words for general meaning, similar sounds, opposites in relation to other words, or similarity in connotation are skills that are required independently even before the eventual interpretation within the context of textual narrative.

Objective No. 2304 Synonyms Level: 3

The student will demonstrate an understanding of synonyms by saying or writing one for each word spoken by the teacher.

System: SCORE

Publisher: Westinghouse Learning Corporation

Objective No. 2305 Word Meaning Level: B

The student will define words in isolation by matching certain words with their definitions. (word definition in isolation).

System: Prescriptive Reading Inventory

Publisher: CTB/McGraw Hill, Inc.

Word meaning vocabulary skills continue to pose one of the most frequently selected problems areas and also one of the most persistent problem areas when addressed. The data in table

attempted word meaning objectives, and fewer than 50 percent were successful in short duration sessions. Nearly 75 percent of the participants working towards mastering homographs were successful.

Table 19

Vocabulary

Objective Topic	Failed Pretest		Failed Posttest		Failed Pretest But Mastered On Posttest	
	N	%	N	%	N	%
Antonyms	1,076	65	342	32	734	68
Homographs	481	66	124	26	357	74
Homonyms	859	60	232	27	627	73
Synonyms	1,564	61	743	48	821	52
Word Meaning	3,927	66	2,070	53	1,857	47
Heteronyms	156	46	49	31	107	69

Study skills, are consumer skills required for the location of information. Referencing materials are organized consistently according to a pattern specific to the variety of the source involved. Pupils are taught the organizational assembly so that the tools of referenced knowledge may be accessible to them.

Objective No. 2503 Aides: References, Footnotes, Bibliography Level: E

The child will locate a topic in response to a SEE reference (e.g., having located "Mohawk Indians SEE Iroquois Indians", the child locates the topic).

System: The Wisconsin Reading Design

Publisher: Interpreted Scoring Systems

Objectives for skills relating to indexing, alphabetizing, and locating information in reference books were not among the most popular areas elected for remediation. The data in table 20 indicate that nearly 1800 participants encountered difficulties with essential skills required to locate and extract information from source references. The success of such participants ranged from less than one-third (32 percent) with the purpose of locating and extracting sought after information to three-fourths (75 percent) where locating titles and inspecting tables of contents skills were involved.

Table 20

Study Skills

Objective Topic	Failed Pretest		Failed Posttest		Failed Pretest But Mastered On Posttest	
	N	%	N	%	N	%
Titles, Table of Contents	531	56	134	25	397	75
Aids: Visual, Tabular	416	57	190	46	226	54
Aids: References; Footnotes, Bibliography	1,772	65	731	41	1,041	59
Selection of Information from Sources	666	87	450	68	216	32
Presentation of Text Material	176	79	64	36	112	64
Summary, Outline	130	56	52	40	78	60

Comprehension, involving the subskills of reading is developed to support the capacity of the reader to detect the literal and/or inferential meaning of the printed paragraph. Understanding that which is read is a culmination of several constellations of subskills applied to narrative test.

Objective No. 24 Main Idea Level: 5

> The student will demonstrate his ability to understand the main idea of a printed paragraph by selecting, from a set of printed choices, a sentence that states the main idea of the paragraph and should be placed at the beginning of the paragraph.

System: Fountain Valley Teacher Support System in Reading

Publisher: Richard L. Zweig, Associate, Inc.

The objective devoted to the understanding of what was read, inferring beyond strictly what was literally printed and organizing mentally the main ideas, facts and necessary details received a priority among remedial treatment implementors. The data in table 21 reveal that large numbers and corresponding high percentages of remedial reading participants encountered difficulty with comprehension skills. The other areas dealing with code breaking, grammar, study skills, and vocabulary are all supportive of the effort to understand that which is read. The act of ascertaining meaning from print is the skill that all of the reading subskills point toward. Comprehension objectives mastery ranged from 29 percent to 64 percent. Objectives dealing with main ideas and the drawing of conclusions were mastered by 53 percent and 60 percent respectively.

Table 21

Comprehension

Objective Topic	Failed Pretest		Failed Posttest		Failed Pretest But Mastered On Posttest	
	N	%	N	%	N	%
Fantasy and Reality	891	72	503	56	388	44
Classifying	879	55	330	38	549	62
Inferences, Cause or Effect	4,215	72	2,296	54	1,919	46
Facts and Details	4,077	68	1,877	46	2,200	54
Following Directions	711	71	288	41	423	59
Main Ideas	3,248	63	1,517	47	1,731	53
Picture Clues	501	49	178	36	323	64
Drawing Conclusions	2,742	70	1,109	40	1,633	60
Sequence	2,136	66	900	42	1,236	58
Literary Forms	460	77	302	66	158	34
Author's Purpose & Techniques	753	68	448	59	305	41
Setting and Character Analysis	1,174	70	830	71	344	29

Reading criterion referenced objectives summary. The greatest number of objectives selected for remedial attention involved comprehension skills. In the short treatments assessed by the criterion referenced approach, about 51 percent of the comprehension objectives were mastered. The second most popularly selected objective cluster was at code breaking skills especially the lower phonics skills involving consonants, blends, and single letter vowels. In excess of sixty percent of these objectives were attained in the course of the instruction.

Criterion referenced objective measurement has a potential for the assessment of bilingual participants who are engaged in developing translation abilities, rather than simply skill acquisition under a remedial reading effort. For example, 96 percent (103 of 109) of a group of spanish dominant pupils achieved mastery on initial consonants. Another group of 50 Hispanic-American pupils demonstrated that 98 percent could master consonant blends in English after Title I instruction. While such students "failed" the objectives at the time of pretesting, the students were not remedial candidates

in the sense of having failed to acquire the skills in the usual sequence of learning. The high incidence of mastery at the point of posttesting suggests that this bilingual population is quite different from the other candidates assessed for growth by means of criterion referenced devices.

Mastery of selected objectives does not mean that a target pupil is currently "on grade level" with respect to reading as well as his or her more advantaged peers. Rather, the accomplishment of specific behavioral objectives as measured by criterion referenced tests material indicates that a pupil mastered a skill, usually anticipated as having been mastered 1 to 2 years earlier in his educational development, while participating in an ESEA, Title I supplementary treatment. The disadvantaged learners have moved up the ladder in the hierarchy of skills beyond where they previously may have stalled without the supplementary instruction.

CHAPTER VI

MATHEMATICS ACHIEVEMENT

Mathematics achievement data were collected on norm referenced and criterion referenced devices in the same fashion described for reading treatments. Data for bilingual participants were segregated since reading translation skills may have confounded the measure and some norm referenced measures were constructed in Spanish. For a group to be included that was English dominant, the group had to exceed the average past performance rate of achievement. For a Hispanic American group to have met the objectives a true difference must have been detected between the pretest and posttest distributions.

Approximately 24,000 Upstate and 62,000 New York City project participants received instruction in mathematics. For purposes of analysis, project group means were segregated as to (1) the source of the data (public vs. nonpublic), (2) score type reported (grade equivalents, percentiles) and (3) the inclusion of a prediction of growth in the absence of ESEA, title I supplementary treatment.

Results From Norm Referenced Test Data

The mathematics achievement data obtained from norm referenced tests are reported in tables 22 and 23 for Upstate districts. The project group means indicates that almost 20,000 Upstate public and nonpublic school participants achieved a growth rate significantly greater than the expected gain without ESEA, Title I treatment. Table 24 includes an additional 1,643 Upstate students who moved their group mean percentile rank position closer to the 50th percentile by at least five points. Illustrations 5 and 6 depict the rates of growth for successful elementary and secondary participants. The pretreatment and post-treatment rates of gain were very similar for elementary and secondary groups.

Table 22

Upstate Public School Mathematics Achievement
in Grade Equivalent Units

Grade Interval	Participants Treated	Participants Tested	Monthly Rate Before Treatment	Monthly Rate During Treatment
1-3	5,099	4,500	.53	1.33
4-6	10,887	9,608	.61	1.45
7-9	3,504	3,039	.59	1.36
10-12	341	293	.55	1.17
TOTAL	19,831	17,440	.58	1.40

Roughly 17,000 upstate public school participants more advantaged peers at a rate of .4 month (1 minus .58) for each month of regular school participation. The data in table 22 indicate that not only had the target population ceased falling behind at that rate, but in addition to gaining a month for a month were recovering the distance at a rate of .4 month in grade equivalent units for each month of Title I participation.

Table 23

Upstate Nonpublic School Mathematics Achievement
in Grade Equivalent Units

Grade Interval	Participants Treated	Participants Tested	Monthly Rate Before Treatment	Monthly Rate During Treatment
1-3	788	666	.55	1.22
4-6	1,203	1,012	.58	1.25
7-9	372	331	.45	1.81
10-12	86	73	.46	.71
TOTAL	2,449	2,082	.51	1.31

Upstate nonpublic school mathematics participants tended to achieve about $\frac{1}{2}$ month for each month of regular classroom instruction prior to ESEA, Title I intervention. During treatment, the same 2,000 pupils achieved about 1.3 months for each month of instruction. The pupils were closing the gap between themselves and their more advantaged peers at a rate of .3 month in grade equivalent units for each month of instruction.

Table 24

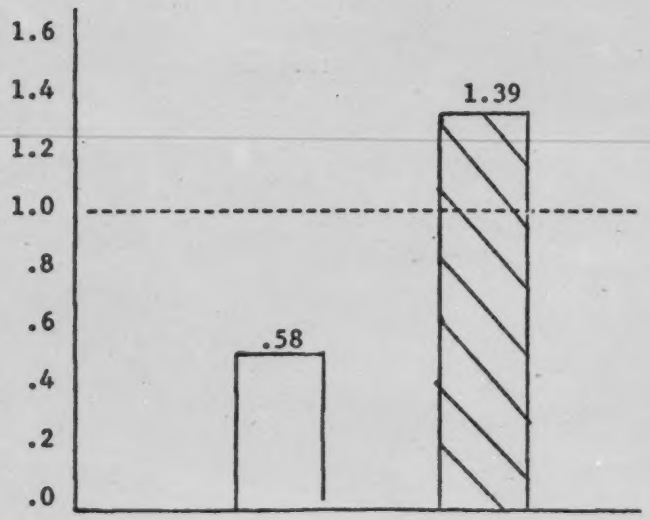
Upstate Mathematics Achievement Data
in Percentile Units

Grade Interval	Participants Treated	Participants Tested	Met Objective
1-3	1,687	1,498	yes
4-6	15	15	yes
7-9	29	24	no
10-12	181	106	yes
TOTAL	1,912	1,643	met group objectives
		24	failed group objectives

Approximately 1,600 participants whose mathematics achievement had placed them close to the 23rd percentile in their respective grades demonstrated that they could perform on an average at least 5 percentile points higher at the conclusion of the Title I treatments.

Illustration 5

Upstate Elementary Mathematics
Rate of Gain



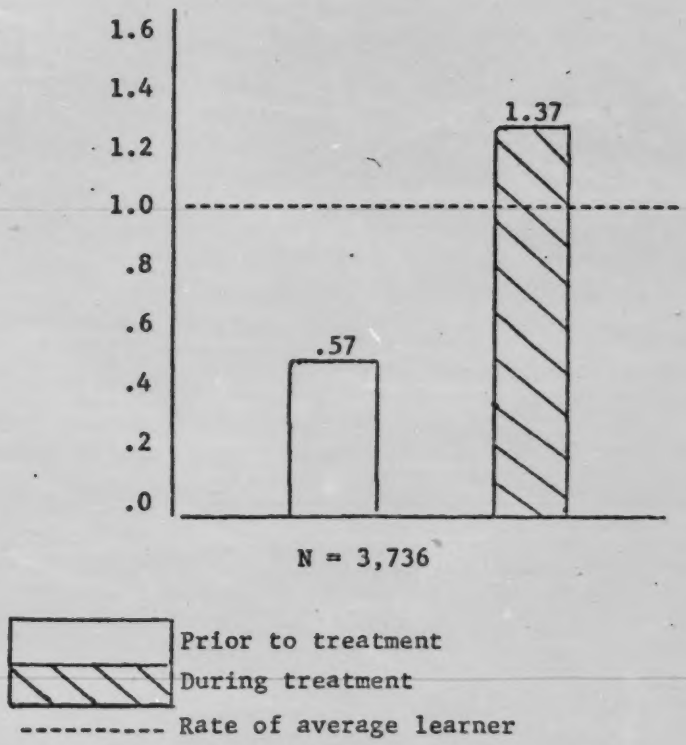
N = 15,786

Prior to treatment
During treatment
Rate of average learner

Prior to ESEA, Title I intervention, the target population had been falling behind at a rate of more than .4 month for each month of classroom activity. During treatment the upstate elementary mathematics population was reducing the accumulated deficit by nearly .4 month for each month of participation.

Illustration 6

Upstate Secondary Mathematics
Rate of Gain



About 37,000 upstate secondary students were achieving at a rate of slightly over one-half month for each month of school activities prior to Title I intervention. During treatment, the target population reduced the gap by almost .4 month for each month of participation.

Where remedial mathematics pupils had been achieving about one-half month's growth prior to ESEA, Title I intervention, the norm referenced tests indicated growth for both elementary and secondary students at almost 1.4 months for each month of supplementary services. Such students were closing the gap between

themselves and their more advantaged peers at a rate of nearly .4 month for each month of exposure to Title I services. Group means for 99% of the data reported in percentile units also indicated a true difference between pretest and posttest means.

The New York City total mathematics test scores obtained from participants tested with norm referenced devices indicated similar success (see tables 25 and 26). The group means suggest that participants, who began the program with a rate of growth of less than one month (about .7 or less per month) of instruction, were achieving at a rate of more than one month (about 1.2 months per month) of Title I treatment.

Table 25

New York City Public School Mathematics Achievement
in Grade Equivalent Units

Grade Interval	Participants Treated	Participants Tested	Monthly Rate Before Treatment	Monthly Rate During Treatment
1-3	6,075	5,203	.49	1.25
4-6	16,660	13,950	.49	1.43
7-9	7,291	5,840	.65	1.71
10-12	6,556	5,223	.72	2.15
TOTAL	36,582	30,216	.56	1.58

Table 26

New York City Nonpublic School Mathematics Achievement
in Grade Equivalent Units

Grade Interval	Participants Treated	Participants Tested	Monthly Rate Before Treatment	Monthly Rate During Treatment
1-3	2,511	2,225	.43	1.95
4-6	5,935	5,400	.58	1.64
7-9	2,536	2,114	.64	2.00
10-12	282	244	.77	2.45
TOTAL	11,264	9,983	.56	1.78

Nearly 10,000 pupils from nonpublic schools had established a rate of gain of about .56 month for each month of regular school activities prior to ESEA, Title I intervention. During the compensatory activities, the same population averaged nearly 1.8 months growth in grade equivalent units for each month of participation. In other words, for each month of participation, the target population reduced the deficit in accumulated distance from the norm group by .8 months.

After the supplemental services, participants in elementary and secondary grades were catching up to the average learner, as depicted in Illustration 7 and 8. Table 27 includes those data reported as percentiles for pupils in long term mathematics treatments in New York City as indicated by the Total Scores. Group means for over 7,000 of these pupils showed a true increase in percentile rank.

Illustration 7

New York City Elementary Mathematics
Rate of Gain

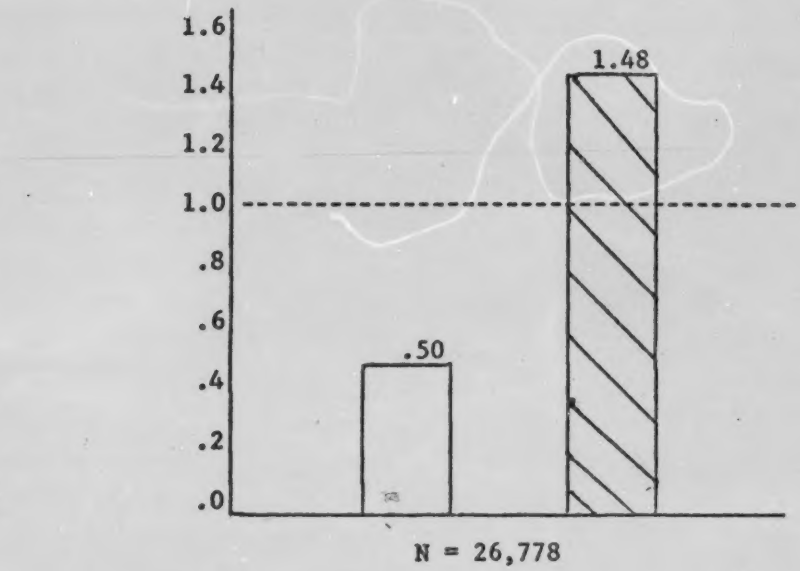
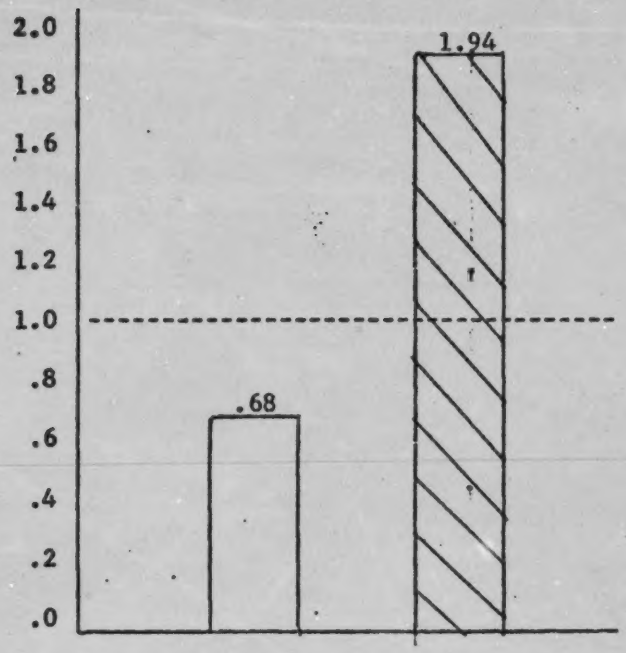


Illustration 8

New York City Secondary Mathematics
Rate of Gain



N = 13,421

Prior to treatment

During treatment

Rate of average learner

Additional data for mathematics participants tested with the New York Citywide Test appear in Appendix B. These data were segregated because they failed to meet the criteria described in the chapter entitled "Background."

Table 27

New York City Mathematics Achievement Data
Reported in Percentile Units

Grade Interval	Participants Treated	Participants Tested	Met Objective
1-3	8,458	7,169	yes
4-6	173	90	yes
7-9	15	15	no
TOTAL	8,646	7,259 met group objectives 15 failed group objectives	

The data provided in table 28 reflect the existence of true differences between pretest and posttest distributions for the upstate group of bilingual pupils receiving remedial mathematics instruction. The data were aggregated across treatments spanning more than 3 months.

Table 28

Upstate Norm Referenced English Mathematics Achievement for Bilingual Participants

Grade Interval	Participants Treated	Participants Tested	Met Objective
Pre-K	49	38	yes
K	38	31	yes
1-3	28	24	no
1-3	443	224	yes
4-6	435	254	yes
7-9	389	238	yes
10-12	91	66	yes
10-12	201	30	no
TOTAL	1,674	851 met group objectives 54 failed group objectives	

The data in table 29 indicate that all groups of New York City bilingual pupils showed significant differences between pretest and posttest distributions on a standardized English mathematics tests.

Table 29

New York City Norm Referenced English Mathematics Achievement for Bilingual Participants

Grade Interval	Participants Treated	Participants Tested	Met Objective
K	154	143	yes
1-3	1,751	1,381	yes
4-6	692	561	yes
7-9	710	613	yes
10-12	80	50	yes
TOTAL	3,387	2,748 met group objectives	

The change in group means for the 2,748 tested participants suggest that the objectives of the remedial mathematics treatments were met.

Some districts chose to test the bilingual participants with a Spanish mathematics subtest of the Cooperative Inter-American Test. By this method, no translation factor interfered with the measure of mathematics skills attainment. The results may be found in tables 30 and 31.

Table 30

Upstate Mathematics Achievement for Bilingual Participants Tested with Spanish Tests

Grade Interval	Participants Treated	Participants Tested	Met Objective
Pre K	49	29	yes
K	38	27	yes
1-3	85	85	yes
4-6	161	148	yes
7-9	139	120	yes
10-12	71	70	yes
TOTAL	543	479 met group objective	

Table 31

New York City Mathematics Achievement for Bilingual Participants Tested with Spanish Tests

Grade Interval	Participants Treated	Participants Tested	Met Objective
1-3	1,634	1,380	yes
1-3	30	27	no
4-6	1,720	1,039	yes
4-6	332	141	no
7-9	354	285	yes
7-9	76	59	no
TOTAL	4,146	2,704 met group objectives 227 failed group objectives	

The differences between pretest and posttest group means indicated that 99 percent of the Upstate participants and 92 percent of the New York City bilingual pupils on the average met the objective.

Mathematics Achievement Summary

The norm referenced achievement data for long duration treatments indicate that about 22,000 Upstate and 47,000 New York City participants in remedial mathematics activities funded under ESEA, Title I were closing the gap between themselves and their more advantaged peers. The average rates of growth ranged from .7 month to 2.4 months for each month of supplementary services. Additionally 1,330 Upstate and 6,782 New York City bilingual pupils, whose mathematics skills have been complicated by their limited translation capacities, also met the behavioral objectives set forth in remedial services.

Results From Criterion Referenced Test Data

The classification system for mathematics objective topics was divided into nine areas. Not all areas receive equal attention for each level with respect to curricula outlined in the State syllabus. An illustration of a typical objective precedes each table so that the tabled data may be related to one of the behaviors sought by the measure. The mathematics criterion referenced data are tabled so that the number (N) failing the pretest and the corresponding percentage (%) of all those attempting the objective may be found under the caption "Failed Pretest." The number and percentage located under "Mastery on Posttest" indicate the pupils who demonstrated objective mastery on the posttest and the corresponding percentage in relation to all pupils who failed the pretest on a particular objective.

Numbers and operations, the introductory concepts of quantity, number lines, number facts and operations are usually taught in the early elementary grades. Basic operations such as addition, subtraction, multiplication and division are often the remedial skills pursued in ESEA, Title I remedial mathematics activities.

Objective No. 1108 Subtraction: Concept and Skills Level: 2

Given a subtraction problem, the student will be able to find the difference and check the solution (whole number sums to 18).

System: Individualized Mathematics System

Publisher: Ginn and Company

Objective No. 1116 Title: Percent Level: 8

The student will demonstrate his ability to name fractional and decimal equivalents of given percents by selecting, from a set of printed choices, the fractional, decimal or percent equivalent of a given percent.

System: Fountain Valley Teacher Support System in Mathematics
Publisher: Richard L. Zweig Associates, Inc.

The data in table 32 reveal that addition, subtraction, multiplication and division objectives were most frequently selected. Concepts and operations employing percentages were missed by 90 percent of those pupils attempting them at pretest administration and achieved by just over one-third at posttest administration. Between 55 and 67 percent, the participants attempting the most basic arithmetic skills

objectives in addition, subtraction, multiplication and division demonstrated mastery at the levels attempted during the posttest administrations.

Table 32

Numbers and Operations

Objective Topic	Failed Pretest		Failed Posttest		Failed Pretest But Mastered On Posttest	
	N	%	N	%	N	%
Pre Equivalence, Equality, Order, Number, Numeral, Fewer, More	1,202	54	408	34	794	66
Whole Numbers	1,048	50	480	46	568	54
Fractions (i.e., Positive Rational Numbers and Zero)	3,891	69	1,993	51	1,898	49
Decimals	1,436	59	635	44	801	56
Real Number System	139	50	58	42	81	58
Addition: Concepts & Skills	4,888	44	1,628	33	[illegible]60	67
Subtraction	5,108	47	1,763	34	[illegible]45	66
Multiplication	4,204	46	1,527	36	2,677	64
Numeration Systems	223	71	116	52	107	48
Division: Concepts & Skills	4,273	58	1,919	45	2,354	55
Properties of Operations and Relations	1,749	65	952	54	797	46
Number Sentences	865	63	410	47	455	53
Number Theory	131	47	46	35	85	65
Estimation, Rounding	253	30	97	38	156	62
Percent	562	90	370	66	192	34

Geometry. The study of plane and three-dimensional relationships is introduced early in the elementary child's mathematical development in a spiral fashion, often in alternate years.

Objective No. 1205 Title: Polygons: Triangles, Quadrilaterals, and Others Level: 4

The student will be able to identify geometric figures: triangle, rectangle, square and parrallelogram.

System: Individual Pupil Monitoring System
Publisher: Hougton Mifflin

The data in table 33 indicate that the mastery of special terminology necessary for the association of two-and three-space representations with defined and labeled mental impages continued to be limited. Only with objectives dealing with parallel and perpendicular lines did at least 50 percent of the pupils achieve mastery. Short duration remedial treatments may not be conducive to accomplishing objectives concerned with spatial relationships.

Table 33

Geometry

Objective Topic	Failed Pretest		Failed Posttest		Failed Pretest But Mastered On Posttest	
	N	%	N	%	N	%
Points, Lines, Rays, Line Segments	139	78	77	55	62	45
Parallel & Perpendicular Lines	187	53	63	34	124	66
Regions, Plans, Space, Curves	71	77	52	73	19	27
Angles	89	70	45	51	44	49
Polygons: Triangles, Quadrilaterals, and Others	346	68	218	63	128	37
Congruence, Similarity, Ratio and Proportion	163	61	99	61	64	39
Polyhedra: Prisms, Pyramids, and Others	66	50	41	62	25	38

Measurement, involving the mathematical concepts of scale, calibration, interval, etc., especially as they relate to temperature, time and money, received considerable remedial attention for the disadvantaged youngster.

Objective No. 1305 Title: Monetary System Level: 3

Given a set of coins, you will identify the total value of the set (quarters, dimes, nickels, and pennies).

System: Individualized Criterion Referenced Testing
Publisher: Educational Development Corporation

Measurement-related objectives apparently lend themselves fairly well to treatments of short duration. The data in table 34 indicate that at several levels about 50 percent or more of the participants originally selected due to deficiencies in measurement concepts, especially with respect to scales, rulers, coin counts, etc., can master such skills given the remedial treatments provided in the brief time provided for instruction.

Table 34

Measurement

Objective Topic	Failed Pretest		Failed Posttest		Failed Pretest But Mastered On Posttest	
	N	%	N	%	N	%
Nonstandard Measures	186	74	37	20	149	80
English System	344	62	126	37	218	63
Metric System, including Conversions	34	49	17	50	17	50
Monetary System	269	48	90	33	179	67
Time and Date	248	44	96	39	152	61
Metric-Geometry, Tigonometry	438	87	248	57	190	43

Statistics and probability, the concepts of frequency and especially averages (means), are repeatedly cited as skill areas needing remediation for junior high school target area youngsters.

Objective No. 1504 Title: Probability: Basic Concepts and Simple Events Level: 6-7

Given the number of each of two kinds of objects in a container, the student will be able to complete the probability of selecting one of a given kind of random (probability of simple events).

System: Prescriptive Mathematics Inventory
Publisher: CTB/McGraw Hill

Pupils interested in predicting events selected objectives dealing with probability. The data in table 35 indicate that the pupils success ranged from 35 percent to 84 percent in mastery of such objectives. The objectives were typical of grade five curriculum work and were being addressed by pupils in junior high school.

Table 35

Statistics and Probability

Objective Topic	Failed Pretest		Failed Posttest		Failed Pretest But Mastered On Posttest	
	N	%	N	%	N	%
Data Tabulation	38	68	21	55	17	45
Probability: Basic Concepts and Simple Events	40	95	26	65	14	35
Probability: Combined Events	85	64	14	16	71	84

Sets, the notions surrounding belonging, grouping, mutual exclusivity, union, matching, identity and intersection constitute complex abstractions. The capacity to perceive such concepts is supportive of mathematical logic.

Objective No. 1603 Title: Matching, Equivalence, Cardinal Numbers, Finite and Infinite Sets Level: 1

Given a set of objects you will identify the cardinal number of the set (to nine numbers).

System: Individualized Criterion Referenced Testing
Publisher: Educational Development Corporation

The pupils achieved the most success with objectives revolving around identification, labeling, recognition and belonging within set

theory. The data in table 36 indicate that the participants were quite successful (in excess of 70 percent achieved such objectives) with lower cognitive processes involving sets but that when the solutions to problems were sought the achievement dropped to less than 45 percent. Apparently, the target population could master the language of sets but was not overly successful in applying the definitions to problems.

Table 36

Sets

Objective Topic	Failed Pretest		Failed Posttest		Failed Pretest But Mastered On Posttest	
	N	%	N	%	N	%
Identification, Membership, Notation	181	56	24	13	157	87
Empty Sets, Subsets, Equal Sets, & Disjoint Sets	53	75	12	23	41	77
Matching, Equivalence, Cardinal Number, Finite & Infinite Sets	135	81	38	28	97	72
Union, Intersection and Cross	37	93	2	5	35	95
Solution Set for Equations and Inequalities	55	30	31	56	24	44

Logical thinking, a higher order of reasoning capacities, requires the skills of analysis of component parts and the synthesis of solutions. Inductive reasoning (where a principle, or rule is developed from the parts) and deductive reasoning (where a known rule or principle is applied to a problem) lead to hypothesis testing and problem solving using the basic skills, especially mathematical tools.

Objective No. 1804 Title: Deductive Reasoning Title: 4

The student will demonstrate his ability to make deductions using Venn diagrams by selecting, from a set of printed choices, the statement that expressed an accurate deduction from data shown in a Venn diagram.

System: Fountain Valley Teacher Support System in Mathematics
Publisher: Richard L. Zweig Associates, Inc.

Almost no participants addressed objectives dealing with inductive reasoning. Only 35 percent of the participants addressing logical connective objectives were successful according to the data in table 37. However, short treatments were employed and found to be successful for "quantifiers" for 95 percent of the participants attempting such objectives. Conversely "logical thinking" objectives were not mastered very well.

Table 37

Logical Thinking

Objective Topic	Failed Pretest		Failed Posttest		Failed Pretest But Mastered On Posttest	
	N	%	N	%	N	%
Statements & Their Negation	31	78	16	52	15	48
Quantifiers	37	92	2	5	35	95
Logical Connectives	31	70	20	65	11	35

Problem solving. Where analytic and evaluative skills are brought together, it requires that concepts and skills learned separately become integrated. Knowledge of number facts and computation capacities are applied to problems contrived to combine the separately learned abilities.

Objective No. 1902 Title: Solution of Problem Level: 7-8

The student will be able to solve a word problem involving the addition and division of whole numbers.

System: Prescriptive Mathematics Inventory (PMI)
Publisher: CTB/McGraw-Hill

The two objective areas described in table 38 seek satisfactory analyses and solutions of problems. Fifty percent (or better) of the participants were successful in mastering the objectives attempted at the time of posttest administration.

Table 38

Problem Solving

Objective Topic	Failed Pretest		Failed Posttest		Failed Pretest But Mastered On Posttest	
	N	%	N	%	N	%
Analysis of Problems	190	52	95	50	95	50
Solution of Problems	445	62	184	41	261	59

Applications of Mathematics represents a category where mathematics skills are applied to the typical problems encountered by pupils in day to day living. The measures taken usually involve word problems and may be confounded by reading skills. The problems are drawn from those areas of personal business transactions, science, social studies, and so forth, which pupils would be likely to encounter in the normal pursuit of living and learning.

Objective No. 1405 Title: Applications Level: 7

The student will demonstrate his ability to solve problems in geography by selecting, from a set of printed choices, the area of a rectangular region from a given geographic map.

System: Fountain Valley Teacher Support System in Mathematics
Publisher: Richard L. Zweig Associates, Inc.

Natural and social science applications of mathematics skills were achieved by over 70 percent of those attempting to master such objectives. Routine or practical applications involving numbers and computations were achieved by over 50 percent of the participants, as displayed in table 39.

Table 39

Applications of Mathematics

Objective Topic	Failed Pretest		Failed Posttest		Failed Pretest But Mastered On Posttest	
	N	%	N	%	N	%
Mathematics: Numbers and Operations	122	50	60	49	62	51
Mathematics: Geometry	111	79	73	66	38	34
Mathematics: Social and Natural Sciences	116	100	31	27	85	73

Where a particular remedial mathematics need exists among several diagnosed deficiencies, some objectives are more likely attainable for a larger percentage of participants than others. Such observations must be tempered by the instructional methodology and time constraints. Objectives dealing with sets and measurement generally were more often achieved than objectives dealing with geometry. About two-thirds of the participants who failed a leveled pretest objective dealing with basic addition, subtraction, multiplication or division could be expected to master the objective prior to the end of the short duration treatment.

Chapter VII

SPECIAL STUDIES INVOLVING COMPENSATORY EDUCATION EFFORTS

Some districts conduct evaluation activities of a higher level than districts which desire simply the determination of whether a particular project was successful. Several districts throughout the State conduct what is termed as action research, a concept that involves the analysis of elements of projects in the reality of school settings in contrast to the carefully controlled laboratory settings which are difficult, if not impossible, to replicate in an applied setting. Four such studies are included in this report to illustrate what special concerns are evolving in local districts.

Purpose of the Review

Contained in section 116.7 of the Federal Regulations is a request for "the results of research and replication studies conducted in the State pertaining to programs for educationally deprived children." The declining allocation for districts in New York State places such studies at a low priority when districts are hard pressed to launch programs of services for the identified educationally disadvantaged. In an attempt to provide a view of the diversity of inquiries taking place at local education agencies, four different areas of investigation are reported here. One study focuses on wringing more diagnostic information about pupil academic deficiencies from standardized tests administered in conformity with the State guidelines. Another inquiry was directed at discovering whether early intervention with selected Title I services would promote the development of readiness skills missing from participants normally expected to possess such skills. A third investigation dealt with the problems of measurement of behavioral change for pupils who are by definition in the lower tail of a normed distribution. Included also is the experience of

a major city in using the Provus Discrepancy Model, a process-oriented evaluation model that attempts to examine elements within a project learning strategy for purposes of replication or reform. The four selected and diverse studies were executed by the local education agencies, although the steps in identifying necessary data, performing collection and analysis procedures, as well as drawing conclusions or inferences were carefully reviewed by the State Education Agency.

Title An inquiry as to whether two approaches of summative analyses for reading and mathematics achievement data from disadvantaged learners would yield similar findings.

Background

The history of the employment of evaluation approaches that use inferential statistics in ESEA, Title I projects is rather brief nationwide. Testimony and anecdotes were often submitted as evidence of successful projects prior to 1970. However, as behavioral objectives, specific to basic skills areas of instruction, became a standard in the ESEA, Title I application, evaluators were directed to inform responsible authorities as to project effectiveness. Evaluators became concerned that the project evaluation designs would lead to (1) valid inferences that behavioral objectives had been met and (2) the detection of genuine achievement over and above the achievement that might be expected without compensatory services.

In New York State, candidates for ESEA, Title I services were expected to be below grade level in basic skill areas (cf. Section I of this report under educationally disadvantaged). One derived score that test publishers report for norm referenced tests is the grade equivalent unit, each of which corresponds to a test raw score obtained by a certain age pupil at a specified time in the academic year.

Grade equivalent scores are popular with some external publics (parents, legislators, advisory councils) because the scores quickly permit persons lacking research backgrounds to detect discrepancies between a pupil's grade placement in school with the grade placement revealed by the grade

equivalent score obtained from a norm referenced test. Intuitively, these publics recognize that an effective ESEA, Title I project would reduce the gap between educationally disadvantaged pupils' grade placement and grade equivalent scores. To respond to such publics in an overall accountability scheme, the Department put forward a plan of data analysis that manipulated grade equivalent scores to determine whether objectives had been met and whether the achievement of Title I participants exceeded the expected achievement in the absence of Title I services. The formula for the analysis was intentionally simple, the elements were logically connected, and the mechanics of manipulation could be executed by an untrained (unsophisticated in the ways of statistical analyses) district staff member below the professional level.

A large part of the educational establishment has quarrelled with the use and interpretation of grade equivalent scores based upon the ways in which test publishers define and extrapolate the units. Quite naturally it followed that critics of the grade equivalent unit would turn their attention to the plan of data analysis put forth for ESEA, Title I evaluations. The critics argued that since the grade equivalent was an unreliable performance indicator then the findings determined from introducing the grade equivalent data to the State developed formula would be erroneous. The United States Office of Education employed a contractor (RMC Corporation) to develop another plan of data analysis that studiously avoided the use of grade equivalent units, to yield a plan of data analysis that would be uniform and acceptable to educators nationwide, and to quell the criticism of opponents to grade equivalent units. (If the U.S.O.E. plan is eventually mandated, then the lay public will need to be

reeducated in other score types and/or translators will be necessary since the units of analysis are not widely recognized.)

The City of Buffalo desired to know whether the State-sponsored analyses and the U.S.O.E.-sponsored analysis would yield similar findings with respect to the detection of the achievement of ESEA, Title I project objectives (that is, achievement in basic skills beyond the achievement expected in the absence of ESEA, Title I intervention).[1/]

Procedure

The total reading and total mathematics matched scores taken from the October 1974 pretest and May 1975 posttest administration of the Metropolitan Achievement Test (1970) were analyzed under both procedures for students in grades two through six. (The pretest did not serve as the selection test.) The original project goal was to improve reading and mathematics achievement beyond expectation (at $p \leq .05$). For the State's actual vs. anticipated posttest analysis, grade equivalent past rates of achievement were obtained, anticipated posttests were predicted and the correlated t-ratios were calculated to compare predicted and actual post-tests. For the U.S.O.E. analysis, pretest and predicted posttest standard scores were derived, pretest and posttest standard deviations computed, the correlations between pretest and posttest scores were computed, and the

1/The narrative and data that follow were paraphrased or retabled from the unpublished work of Thomas B. Talbot, Supervisor of Evaluation, Buffalo Public Schools.

correlated t-ratios were calculated. The t-ratios obtained from the two methods were compared to determine whether identical differences in distributions had been detected.

Results

The criterion was set at $p \leq .05$ (no difference exists between the predicted and actual posttest means) for both analyses. The calculated t-ratios were compared to the critical values required to reject the "no-difference" proposition. In the reading treatment it may be inferred that the objective was met at grades two, three, five, and six. The data in tables 40 and 41 indicate under each analysis whether or not the objective was met for each grade within the appropriate subject matter area. The rightmost column in both tables indicates that in every one of the ten comparisons between the two methods of analysis the same decision was revealed. In every case that the State analysis detected that an objective had been met, the U.S.O.E. analysis indicated the same phenomenon.

TABLE 40

Comparison of Reading Achievement Data Analyzed by Two Summative Models [1/]

		State Plan of Analysis					U.S.O.E. Plan of Analysis					
		Grade Equivalents					Standard Scores					
Grade	Number of Participants	Pretest Mean	Predicted Posttest Mean	Post Test Mean	t ratio	MET Objective	Pretest Mean	Predicted Posttest Mean	Post Test Mean	t ratio	MET Objective	Agreement in Findings
Two	11	1.73	2.19	2.25	.6809	No	36.91	46.00	46.45	.2961	No	Yes
hree	14	2.53	3.04	3.66	4.3110	Yes	50.29	53.00	61.64	7.0101	Yes	Yes
Four	11	2.77	3.17	2.78	2.7726	No	53.36	58.00	52.73	-2.8314	No	Yes
Five	24	4.34	4.91	5.15	.8364	No	66.75	72.00	73.21	.6015	No	Yes
Six	13	4.40	4.87	5.03	.6147	No	67.92	72.00	73.31	.5687	No	Yes

TABLE 41

Comparison of Mathematics Achievement Data Analyzed by Two Summative Models [1/]

		State Plan of Analysis					U.S.O.E. Plan of Analysis					
		Grade Equivalents					Standard Scores					
Grade	Number of Participants	Pre-Test Mean	Predicted Posttest Mean	Post Test Mean	t ratio	MET Objective	Pre Test Mean	Predicted Posttest Mean	Post Test Mean	t ratio	MET Objective	Agreement in Findings
Two	13	1.41	1.66	2.68	5.5961	Yes	32.77	48.00	55.69	2.2036	Yes	Yes
hree	16	2.36	2.82	4.26	13.1108	Yes	51.000	58.00	74.94	13.8764	Yes	Yes
our	13	3.21	3.71	3.71	1.4240	No	62.38	69.00	70.77	.9397	No	Yes
ive	24	4.58	5.19	6.25	5.6932	Yes	78.42	82.50	91.12	6.6214	Yes	Yes
ix	11	4.90	5.43	5.92	3.9814	Yes	80.64	85.00	88.64	3.3001	Yes	Yes

1/All computations were completed by the Buffalo Public School System.

Interpretation

The number of subjects was very small. Consequently generalizations concerning the capacity of the two analyses to yield the same decision-making information should be avoided pending further studies. In this study similar information for evaluators, decision makers, and external publics was provided with either approach, with the exception that a data form already familiar to the external publics is available from the State summative model. This should not be construed to be an argument for the status quo, but rather to raise a challenge to the critics who decry the State summative analysis scheme. Preliminary evidence indicates that the simple approach may withstand the test of the critics.

TITLE: The Auburn Investigation: An attempt to replace one norm referenced test with a criterion referenced test

Background

Auburn City School District attempted to derive standardized measures of pupil behavior in Title I reading treatments at two points in a project's life, once at the outset and once at the conclusion. Typically, the district administered a districtwide norm referenced test in the spring which served both as an eligibility-screening test for the Title I potential participants at the next session and as the post test for the current participants. A separate administration of the norm referenced device was conducted in the fall as a pretest for Title I participants. The district desired the fall pretest measure but wanted detailed diagnostic information for individual prescription setting in addition. The testing of participants in the fall with a norm referenced device followed quickly by a diagnostic device appeared to be (1) repressive for participants, (2) expensive, and (3) unnecessarily time consumming. To avoid double testing in the fall while still retaining a normed pretest measure and a diagnostic profile, the district entered into an arrangement with a publisher whereby the findings from the diagnostic criterion referenced device would be used to predict the probable norm referenced position of the target population. The spring norm referenced test would be retained for purposes of posttesting and eligibility determination.

Procedure

The district conducted what basically amounts to a correlation study, similar to the procedure that publishers use as an indicator of validity for a new measurement device. Both devices had standard or scaled scores available. The California Achievement Test (Total Reading Test) served as the criterion for the Prescriptive Reading Inventory, the diagnostic criterion referenced device. The district proposed to administer the California Reading Test and the Prescriptive Inventory concurrently to the Title I participants. (Actually, a month elapsed between the administration of the Prescriptive Reading Inventory and the California Achievement Test.) The publisher provided a table of scaled score estimates for predicting California Achievement Tests from Prescriptive Reading Inventory.

For each grade the district compared the mean scaled score taken from both devices and tested for a true difference. A Pearson product moment correlation statistic for each grade and the total educationally disadvantaged treatment population was also computed. A correlated t-ratio was computed to determine whether true differences existed for each grade and the total population.

Results

The first analysis was conducted on the obtained standard scores from the California Achievement Test (C.A.T.) and the predicted C.A.T. scaled scores taken from the Prescriptive Reading Inventory (P.R.I.). In grade two, a true difference was detected (the no-difference proposition was rejected, $p \leq .05$)

Comparison of predicted and obtained California Reading Test Scores

Grade	Number of Participants	Average C.A.T. Obtained Scaled Score	Average C.A.T. Obtained Grade Equivalent	Predicted C.A.T. Scaled Score From P.R.I.	Predicted C.A.T. Grade Equivalent From P.R.I.	t ratio	Correlation Coefficient
Two	26	292.5	1.9	272.9	1.5	2.67[1/]	.038
Three	14	322.9	2.5	325.6	2.5	.64	.78
Four	14	335.9	2.7	333.7	2.7	.58	.85
Five	17	361.4	3.4	363.9	3.4	.31	.57
Combined	71	323.5	2.5	317.1	2.4	1.74[2/]	.56

[1/] Significant at $p \leq .05$

[2/] Significant at $p \leq .10$

between the obtained and predicted scaled scored means. The correlation coefficients for each grade were computed and may be found in table 42. The coefficients ranged from .038 (grade two) to .85 (grade four). The combined grades coefficient was .56.

Interpretation

The real difference in means at grade two and the accompanying coefficient of .038 indicated that the pupils did not come close to the same scores or vary in the same way on the two devices. The small numbers of participants in the study mitigate against generalizing for a larger population. For this population, however, the Prescriptive Reading Inventory (the criterion referenced device) did not predict the California Achievement Test scores well for individual pupils in the different grades. At this point in time, the district should not try to substitute the Prescriptive Reading Inventory scores for California Reading Achievement Test scores in spite of the other attractive circumstances.

Title: The Buffalo Experience: An Initial Attempt at Process Evaluation by Management Discrepancy Analysis

Background

The City of Buffalo has maintained a continuing interest in the effectiveness of ESEA, Title I projects. As a result of the implementation of an automated pupil data file, measured pupil achievement led to a greater clarity of the results of the ESEA, Title I efforts. While overall outcomes became clearer, the administration detected that the results within the same treatments emerging from different sites were not uniform. Feedback from several internal groups suggested that the same treatment as described in the project proposal was not uniformly recognizable at each and every site where treatment installation had presumably occurred. One purpose of making an inquiry as to internal consistency in treatment installation was to elicit data that would permit project administrators to (1) know of discrepancies between the proposed and actual elements of the treatments early enough in the school year for corrective action so that the treatments might be standardized and (2) make decisions at the conclusion of the effort as to whether the treatment should be redesigned, maintained, or discarded.

Procedure

The management discrepancy model developed by Malcolm Provus consists of five stages composed of Design, Installation, Process, Product, and Program Comparison. Within the stages, a process evaluator reviews the design (treatment) adequacy, installation fidelity, process adjustment, product assessment and cost-benefit.[1/] Buffalo administrators were following

[1/] Malcolm Provus, Discrepancy Evaluation for educational Program Improvement and Assessment, Berkley, California: McCutchen Publishing Corp., 1971, p. 184.

the procedures developed for Pittsburgh, Pennsylvania and employed an evaluator to review Title I projects already underway. The first year effort was confined to reviewing the design adequacy and determining the fidelity of the installation.

The initial efforts by the evaluator centered on securing agreement for the standards to be met within the elements of the treatments and then on determining whether discrepancies existed (in reference to the standards). The content elements reviewed were those dealing with staff prerequisites differentiated by position, inservice training, participant selection criteria and treatment pretest behavior, materials, facilities, and supervision. Stage one involved a content taxonomy built around the project proposal and project staff's description as follows from Provus' work:

1. A description of the client population and the criteria employed in their selection as they are reflected in the program staff's understanding of the program.
2. A description of the staff, the criteria for their selection, the level of their preprogram competency, and the expected level of their competence following any in-service training.
3. The major terminal objectives of the program--that is, the behaviors clients will be expected to demonstrate upon completion of the program.
4. The enabling or intervening objectives that must be negotiated before terminal objectives can be realized--that is, the intervening behaviors or tasks students must complete as a necessary basis for terminal behavior.

5. The sequence of enabling objectives and the nature and sequence of learning experiences that will lead to the attainment of enabling objectives (this sequence generally takes the form of an ordinal list at the first stage of evaluation).
6. Characteristics and entry behaviors of clients--that is, those characteristics or behaviors students should exhibit upon entry into the program.
7. A descriptive list of administrative support requirements, facilities, materials, and equipment.
8. A description of staff functions and the number and type of positions.
9. Finally, the casting of all program activity in a time frame so as to position events relative to each other over time.[1/]

Appropriate questionnaires and interview schedules were developed to standardize the responses. All process measurement devices were administered by the one evaluator. The report consisted of a determination of whether elements and standards related to the treatment design existed (content) as well as the congruence of the treatment installation with that proposed.

Results

The focus of this study was to review the feasibility of conducting a management discrepancy analysis in a large city, rather than to report the actual findings of the process evaluator. However, to support the points made here, specifics from the evaluator's efforts are cited.

The effort was confined to stages I and II of the discrepancy model. Discrepancy information may be used to redefine (or redirect) process or

1/Provus, Malcolm.,"Evaluation of ongoing Programs in the Public School System," Evaluation, 1969 Yearbook of the National Society for the Study of Education: University of Chicago Press, 1969, pp. 267-268.

to improve the control of process (for uniform implementation). In the Buffalo experience the information did not appreciably affect the existing projects. Site visitation did not commence until January 27, 1975 for projects implemented in September, 1974.

The review of documentation (the proposal and source materials) was accomplished. Elements without standards were isolated (especially with respect to staff prerequisites). The stage 1 process was related to revision design adequacy and the task of seeking agreements on standards was initiated. The stage 1 process appears to be reasonable as part of a Title I process evaluation scheme.

The stage II analysis, fidelity of installation (or congruency between that which was proposed and implemented), was confounded by the lack of standards or defined activity uncovered in stage 1 (e.g., where activities by aides were unspecified in the documentation, the adequacy of the aides' fulfillment of the activity observed could not be judged). Outright discrepanices were uncovered and documented in the 18 sampled schools. The possible causes for some discrepancies were partially revealed from the mechanisms for eliciting the data from project staff. The stage II analyses were also found to be feasible.

Interpretation

Two stages of the 5 stage management discrepancy analysis were implemented in Buffalo in the latter half of the life of the 1974-75 Title I projects. The district found that the development of standards and specificity of treatment elements would require considerable improvement. The discrepancy analysis revealed unacceptable variations, but also provided sufficient documentation for planning the next session

where treatments would be reinstalled. No attempts were made to concurrently revise processes of implementation, determine whether enabling objectives were met, or conduct a cost/benefit analysis. The district was able to encounter what questions should be asked as well as what standards or criteria should be developed prior to collecting information. The Buffalo experience with a management discrepancy analysis scheme of process evaluation was encouraging, but did not provide information soon enough for corrective action in the same funded year, nor did the decision makers have sufficient information as to whether the treatments should be redesigned, maintained, or discarded. In all probability, a major effort at process evaluation in Title I projects. (including a refined and tailored discrepancy model) may require an effort of 2 or more years to initiate.

Title North Babylon's readiness retracement: primary pacing as a means to foster undeveloped readiness skills.

Background

North Babylon personnel prepare a profile of student capacities near the end of the kindergarten year. Through the use of a structured candidate evaluation form, the Metropolitan Readiness Test and the Stanford Binet Intelligence Quotient Test, a prognosis of kindergarten participants, probable success in a regular first grade classroom setting is predicted. A committee of kindergarten teachers, reading specialists, school psychologists and building principals reviews the profile of each educationally disadvantaged learner. For kindergarten pupils whose success in a regular first grade class is doubtful, a special Title I funded primary pacing class is offered. Parents are consulted and given an opportunity to withdraw the child from the compensatory pacing treatment. The district's position is based upon early detection (and elimination) of basic skill deficiencies.

The treatment in pacing classes involved activities that would improve small and gross motor skills, visual memory, discrimination and visual motor coordination, auditory memory and discrimination, language expansion, phonics readiness and writing skills. The district desired to know whether the treatment of thorough readiness skill retracement would bring about a higher performance on a standardized norm referenced reading test among pacing pupils than equivalent pupils who did not receive the special pacing treatment.

Procedure

The district nominated 125 candidates for the pacing classes. Seven classes

staffed with seven Title I-funded teachers were organized to serve 105 pupils. The pupils were not randomly assigned, but a residue of 20 equivalent participants were available for a control group. The 20 comparable pupils entered regular first grade classes. In September, 1974 the Metropolitan Reading Readiness Test was administered to the 105 pacing treatment participants, the 20 control participants and 23 first grade non-candidates. In May, 1975, the three groups were administered the Metropolitan Reading Test (Primary I), as a posttest. An analysis of covariance was conducted on percentile scores with the Metropolitan Reading Readiness Test serving as the covariate. The adjusted posttest means were compared through the Scheffi technique, with the level of confidence set at .10 .

Results

The obtained means, adjusted means, and participant numbers may be found in Table 43 .

Table 43

North Babylon Pacing Treatment

	Number	Pretest Obtained Mean	Posttest Obtained Mean	Adjusted Posttest Mean in Percentiles
Pacing participants	94	40.4	42.7	44.2
Comparable control	20	39.2	48,4	50.1
Non comparable control	23	88.9	74.0	66.4

The two comparable groups advanced in mean percentile rank position from pretest to posttest, while the educationally advanced participants scored almost 15 points below the pretest on the average. The comparable control group advanced nearly 9 percentile points between pretest and posttest. The F ratio of 3.03 approximately equalled the required $F(.05)$ ratio of 3.06.

Following the adjustment of the posttest scores, the groups' posttest means were compared two at a time. F ratios are computed in an a priori fashion, followed by the compilation of the F^1 ratio to avoid Type I errors (the detection of differences that are not true differences). The data for the comparisons are presented in Table 44 .

Table 44

F-ratio Comparisons Among First Grade Treatment and Nontreatment Groups

Treatment	Obtained F-ratio	Level of Significance	
		.10	.02
Pacing vs. comparable nonpacing	.78	No	No
Pacing vs. advantaged	12.37	Yes	Yes
Comparable nonpacing vs. advantaged	3.85	No	No

$F_{.10}$ ratio required = 6.14 $F_{.02}$ ratio required = 9.56

Interpretation

The district designed a remedial treatment to develop cognitive readiness and specifically, reading prerequisite skills. It was expected that the pacing treatment participants would outperform the comparable nonpacing participants. The F-ratio of .78 indicated that this result did not occur. The comparable nontreatment participants performed just as well as those in the ESEA, Title I treatment. In light of the findings, district staff speculated that general maturation effects operated to fill in the deficiencies, without the necessity of retracing the readiness activities with a compensatory treatment. The comparable pupils in and outside the treatment may have developed a little slower than the average, but nonetheless acquired the necessary skills at their own rates of development.

Summary

The effort to obtain a reasonable norm referenced prediction from a criterion referenced device was particularly intriguing. Although the attempt to force a diagnostic device to do a double service (to diagnose specific deficiences and to yield a normed assessment) failed in this study, the potential benefits are probably sufficient to warrant further activity in this direction. The readiness skill recovery treatment (pacing) findings were naturally a disappointment. To eliminate the possibility of later academic failure is certainly a worthy goal when predictors are valid. The findings of the comparison of the summative models will probably puzzle some educators. The congruence of the detected differences, while based upon a small sample, may generate some second thoughts on the proposed departure from grade equivalent units, a term of assessment readily recognized by the public to whom educators are accountable. The Provus Discrepancy Model implementation process provided considerable information as to process evaluation logistics (as well as the status determination of project elements). The avenue of process evaluation is one that educators intuitively recognize as a necessary course to be pursued, but may now be recognized as a most difficult and time-consumming task.

CHAPTER VIII

PROJECTS WITH PROMISING ACTIVITIES

The apparent phenomenal growth of educationally disadvantaged youngsters in some project activities is a signal to decision makers. Remedial treatments wherein student achievement occurred and reasonable costs were associated with the facilities, staff, materials, etc. are often cited as promising activities for transplanting to other similar situations (ease of replication).

Requirements for Nomination

In New York State the search for such activities in compensatory education projects involves checking pupil achievement against several standards. The process of isolating promising activities involves the following:

1. The pupils must have been selected for the treatment on a score taken at a different time from when the pretest score was obtained. This phase of needs assessment eliminates the fallacy of achievement associated with the regression to the mean evident at the tails of a distribution.

2. The activities selected for citation must be in districts that have comparable districts elsewhere in the State. Since the largest part of New York State's ESEA, Title I monies are directed toward large urban districts, the isolation of promising treatments in high total cost projects with reasonable per pupil expenditures are particularly attractive. Large groups permit greater confidence when interpreting results and remove the likelihood of encountering results influenced by one extraordinary teacher or similar nonrepresentative treatment factors. However, many smaller upstate districts contain comparable learners and demonstrated promising activities are also reported here.

3. Measures of effectiveness must be both statistically and educationally significant. That is, real differences in means must be established and the magnitude of the growth (impact) may be intuitively recognized as substantial by people from appropriate disciplines.

4. The individual pupil performance prior to entering the activities must be empirically estimated as well as the performance across the supplementary activities. This is commonly accomplished by the use of a simple linear regression wherein a monthly rate of gain prior to treatment is derived from the pretest and the product of this increment times the number of months of supplementary treatment is added to the pretest in an effort to estimate the posttest in the absence of the treatment. The pupils posttest obtained from testing is compared to the estimated posttest and the differences are tested by means of a correlated t-ratio.

5. The projects must contain specific performance objectives in either reading or mathematics achievement.

Selection

The promising activities selected for this report met the conditions cited above. For interpretation, the growth or data points are presented in grade equivalent units and the technical objectives were paraphrased as goals. The pupils generally achieved 1 month growth or better for each month of the supplementary activity in either reading or mathematics.

Summary

It may be interesting to note that all of the reading and mathematics activities nominated were "pull-out" treatments where segments of the target population were taken from regular classes and treated separately for specific deficiencies. The practice of removing pupils from the regular classroom has been questioned because of a potential communications breakdown between the special Title I staff and the regular classroom teacher. The project directors indicated that a special effort (including a conference mechanism among staff) had been made to avoid gaps in communication between the classroom staff and the staff of the Title I treatment site. Among the promising activities nominated none involved extra help by Title I staff within the regular classroom.

Each of the promising activities shared the emphasis on a specific skill diagnosis followed up by a prescription, similar to the medical model. Frequently a specially trained diagnostician would diagnose and prescribe, with the prescription being carried out by a subject matter specialist and/or paraprofessional as described in the Rush-Henrietta activities. None of the treatments appeared to be simply a doubling of the exposure time of material presented in the regular classroom. A different set of activities was prescribed.

The promising activities did not all use the same model of organization. Island Trees was organized for small group work, Jamestown and Indian River employed on individualized programmed approach, while Middle Island carried out instruction on a one-to-one tutorial basis.

The treatments reported here shared the conditions of diagnosis and prescription and physical removal of pupils from the classroom to a special remedial center although the organization for delivering instruction at those centers varied as to the district.

tle of Project Remedial Reading Program — Grades 4 - 6

cation Jamestown — Fiscal year 1974-75

dget $40,353

st/Participant $404 — Participants 102

jor Goal: The target population was expected to achieve more during remedial treatment than was anticipated in the absence of the treatment.

tivities: In preparation for the remedial treatment, a 3-day inservice workshop was conducted for the Title I remedial teacher and aide as well as the six classroom teachers who sent the remedial reading candidates to the center. A commercially prepared instructional objective based system (matched with criterion referenced tests) resulted in an individual diagnosis and prescription for each pupil. The prescriptions involved 30 different sources of the most popular remedial materials for specific identified deficiencies. The students participated in the highly individualized program for approximately 120 supplementary hours of instruction. (This successful treatment was also funded at the grade levels by ESEA, Title I in fiscal 1973-74.)

indings: The 88 youngsters for whom both a Gates MacGinitie pretest and posttest were obtained in September, 1974 and June, 1975, were expected to achieve about 4 months in grade equivalent units. In that 9-month period the target population achieved 12 months growth.

tle of Project Reading Instruction for the Disadvantaged Grades 4 - 6

cation Island Trees Fiscal year 1974-75

dget $64,298

st/Participant $397 Participants 162

jor Goal: The Remedial Reading population would achieve more during the ESEA, Title I treatment than would be expected in the absence of the treatment.

tivities: Three teachers and three aides provided instruction at four elementary schools to small groups of remedial reading candidates. The teacher prepared a prescription after skill diagnosis which, depending upon the complexity of the skill, was executed by the teacher or the aide. The participants received approximately 100 extra or supplementary hours of remedial reading activities.

ndings: The target population was pretested in September and posttested in June with the Stanford Reading Achievement Test. Fifty-three fourth graders achieved 9 1/2 months growth in grade equivalents when just 5 1/2 months growth was expected. Fifty-one fifth grade pupils achieved 13 months when their previous rate indicated that 5 months growth should be expected. Thirty-three sixth grade pupils achieved 11 months across the 9-month period during which just 5 months achievement was expected.

e of Project	Mathematics Assistance to Elementary School Students	Grades	2 - 6
tion	Rochester	Fiscal ear	1974-75
get	$297,540		
t/Participant	$180	Participants	1,653

or Goal: The mean achievement in mathematics was to exceed the mean achievement nticipated based upon the pupils' historical rate of growth.

tivities: A profile of mathematics skill deficiencies was prepared by a diagnostician for each pupil. The pupils were served by 27 mathematics teachers and 10 aides working nder a supervisor. The youngsters attended a mathematics center that contained materials with a strong orientation toward multi-sensory stimulation. Each pupil's supplementary ctivities consummed approximately 70 hours.

ndings: The pupils were pretested in September, 1974 and posttested in April, 1975 with the Metropolitan Mathematics Achievement Tests. The pretest and posttest means for 533 secondary third grade pupils were 1.64 grade equivalents and 2.58 grade equivalents, respectively. The 910 pupils in grades four through six averaged 3.47 grade equivalents units on the pretest and 4.41 grade equivalent units on the posttest. The second and third grade pupils achieved 9 1/2 months during a 7-month period when 2 1/2 months growth was predicted. During the corresponding time period the fourth through sixth grade pupils achieved 9 1/2 months when only 4 months growth was anticipated based on the pupils past performance.

itle of Project	Reading Resource Centers	Grades 4 - 8
ocation	Middle Island	Fiscal year 1974-75
udget	$31,850	
ost/Participant	$188	Participants 169

ajor Goal: The participants were expected to accelerate their rate of reading during ESEA, Title I activities beyond the rate obtained in the past in the absence of the supplementary service.

ctivities: The activities included the classical tutorial approach for 54 supplemental hours. Extensive inservice training was provided for the reading resource teacher and 12 tutors. A project facilitator maintained the communication link between the separate reading resource center and the classroom. The one-to-one tutorial activities were further supplemented when students voluntarily elected to participate in additional after school sessions.

Findings: Eighty-nine participants in grades 4 and 5 were expected to achieve about 1/3 month's growth for each month of instruction based upon their past performance. During the pretest to posttest interval of 7 months, the pupils achieved at a rate of 2 3/4 month's growth for each month of supplementary services. Similar findings for the 63 sixth through eighth grade pupils indicated 1 4/5 months achievement for each month between the pretest and posttest when only 1/2 month per school month was expected based upon prior experience. The mean pretest results were over 2 years below grade level for the 152 pupils.

le of Project	Diagnostic Mathematics		Grades 2 - 6
ation	Brooklyn, District 14	Fiscal year 1974-75	
get	$880,000		
t/Participant	$385	Participants	2,625

jor Goal: The target population was to demonstrate achievement in mathematics beyond expectation in the absence of treatment as measured by the total (combined) mathematics scores taken from the Metropolitan Achievement Test.

tivities: Preparatory to the implementation of the treatment, 2 paraprofessionals and 1 teacher from the 26 schools received inservice training in the techniques of skill deficiency diagnosis and profile construction. The focus of the 200 hour per pupil supplementary service was on basic mathematics operations. Individual pupil arithmetic study kits were prepared to meet the prescription developed for each pupil.

indings: Matched pairs of Metropolitan Mathematics Achievement Tests (October, 1974 pretest and May, 1975 posttest) were available for 2,285 participants. The rates of gain for each month without Title I services for pupils in grades 2 through 6 were .48, .67, .57, and .54 in grade equivalent units, respectively. In contrast to this range of 1/2 to 2/3 month growth without Title I services, the participants achieved at rates of 1.2, 1.4, 1.0, 1.7 and 1.2. In each of the grades the participants achieved at or better than 1 month for each month of Title I supplementary service.

tle of Project Reading Skills Extension Program Grades 2-12

cation Rush-Henrietta Fiscal year 1974-75

dget $87,460

st/Participant $361 Participants 268

jor Goal:

Pupil achievement in reading comprehension during Title I activities should exceed he amount expected based upon past experience.

ctivities:

This third year treatment replication involved an integrated team consisting of 10 eading resource teachers, 9 reading teachers, and 12 paraprofessional aides. The istrict's systems model required a clinical reading profile (input) with prescribed upplementary work (process) and carefully monitored achievement (output) for each pupil. he supplementary work usually involved specifically tailored tutorial activities in a rogrammed fashion.

indings:

Pretest scores from the Stanford Achievement Test for October, 1974 and posttest scores from May, 1975 were reported for 254 participants. In the 7-month period the second and third grade pupils were expected to achieve 3 months, the fourth through sixth grade pupils, 4 months, the seventh through ninth grade pupils, $4\frac{1}{2}$ months, and the tenth through twelfth grade pupils, 4 months in grade equivalent units. The pupils in these grade intervals actually achieved $14\frac{1}{2}$ months, 16 months, 17 months, and 17 months, respectively, in reading comprehension.

tle of Project Educational Services Grades 4-6

cation Glens Falls Fiscal year 1973-74

dget $60,481

st/Participant $465 Participants 130

jor Goal:

In vocabulary development and comprehension, 50 percent of the target population in rades 4-6 were to demonstrate an observed gain of 1 month for each month of instruction measured by the Gates-McGinitie Reading Test, Survey D.

tivities:

One Central Education Service Center, staffed with a clinical reading teacher and sychologist, served as the laboratory for the diagnosis of pupil skill deficiencies nd preparation of a prescription. The prescriptions, which were heavily dependent pon programmed materials, were executed by paraprofessionals at the home schools in a ocation separate from the classroom.

indings:

The 120 participants for whom both a Gates-McGinitie pretest (October, 1974) and osttest (May, 1975) were available were expected to achieve 6 months in grade equivalent nits across the 7-month period. The pupils actually achieved 9 months while articipating in ESEA, Title I activities.

e of Project Primary Reading Grades 2 and 3

tion Indian River Central School Fiscal year 1974-75

et $18,399

/Participant $236 Participants 70

r Goal:

The achievement in the total reading score would exceed expectation as measured by Stanford Achievement Test.

ivities:

Each pupil participated in a supplementary reading program for about 88 hours. A escription, developed by a corrective reading teacher, was keyed to a commercially epared instructional objectives program closely monitored by criterion referenced tests. e four paraprofessional aides who received inservice training executed parts of the ogram. Additionally, specific language master word cards were prepared for specific pil needs.

ndings:

The Stanford Reading Achievement Tests were administered in October, 1974 and ne, 1975. The 65 members of the target population for whom matched scores were ailable were expected to achieve 3 months growth in the 8-month period. The rticipants actually achieved 8 months in grade equivalent units during the period of e Title I supplementary services.

le of Project	Remedial Mathematics	Grades 2-5
ation	Oyster Bay	Fiscal year 1974-75
get	$31,044	
t/Participant	$425	Participants 73

jor Goal:

Upon conclusion of the project, it was expected that at least 50 percent of the rticipants would show a gain of one grade level higher than they were performing at e beginning of the project.

tivities:

Pupils received ESEA, Title I supplementary mathematics instruction for our every day throughout the school year. The pupils were removed from the classroom or either small group instruction or individual work with one of two corrective thematics teachers.

indings:

Metropolitan mathematics pretest and posttest scores from September, 1974 and ay, 1975 were complete for 72 participants. Seventeen (17) third grade pupils achieved bout .6 month in grade equivalent units for each month of school prior to treatment and .8 month during the Title I treatment. Twenty-five fourth grade pupils achieved .7 onth during school prior to treatment and 1.7 months during the Title I treatment. hirty fifth grade pupils achieved almost 2 1/2 months growth for each month of reatment in contrast to the previous rate of just .7 month for each school month.

tle of Project New Start X — Grades 4-6

cation Elmont — Fiscal year 1974-75

dget $10,157

st/Participant $161 — Participants 63

jor Goal:

The district proposed to increase computational, conceptual, and mathematics problem olving skills so that growth would be 1 month for each month of involvement in the rogram as measured by the Stanford Achievement Test.

tivities:

Supplementary mathematics treatment for each pupil amounted to about 88 hours across 5 weeks. One teacher and two aides developed activities specific to needs in one or ore of the three areas of mathematics under remediation for each of the participants.

indings:

The target population was pretested in October, 1974 and posttested in May, 1975. he mathematics pupils were expected to achieve about 4½ months, a rate of .6 onth for each month of Title I treatment exposure. The pupils actually achieved 1 year, months in grade equivalent units, a rate of 1.7 months for each month of supplementary ervice.

Chapter IX

READING ACHIEVEMENT FOR NEW YORK CITY PUPILS

For a majority of decentralized school districts in New York City, the annual citywide testing program was used in evaluating ESEA, Title I project effectiveness. Standardized achievement tests are administered each spring by the Office of Educational Evaluation (OEE), the New York City Central Board of Education. As a result of widely publicized violations of test security in 1974, in which some teachers were found to be teaching items from the tests to be administered, the OEE decided to obtain a "secure" test for the 1975 citywide testing program. The OEE notified test publishers of the need for a secure test, accepted bids, and selected a test to be published by Harcourt, Brace and Jovanovich. The New York City Reading Test was developed from a bank of unused test items for the 1973 version of the Stanford Achievement Test, was administered citywide in the spring of 1975 under strict security procedures. Many Title I projects were evaluated via this new test.

Because the Metropolitan Achievement Test (MAT) had been the citywide test used in 1974, any year-to-year comparison of test data had to be facilitated by use of conversion tables provided by Harcourt, Brace and Jovanovich, the publisher of the MAT, as well as the New York City Reading Test. Therefore, prior to analyzing and reporting test results, districts first had to convert scores from the 1975 New York City Test to Metropolitan Test scores. However, the Office of Educational Evaluation was able to provide conversion tables for only the Reading Comprehension subtests, due to questionable comparability of the conversions of the word knowledge

subtest. This problem introduced a factor of great concern to many districts; the following quotation from the summary of the Final Evaluation Report for a Community School District Title I project best states the concern that many administrators had expressed:

> In a May 28, 1975 memorandum to Executive Directors, Superintendents, Staff of the Office of Funded Programs and Staff of the Office of Educational Evaluation, Dr. Polemeni distributed conversion tables which were to be utilized for evaluation purposes only. A conversion table was provided for only one subtest, Comprehension, on the strength of the argument that the other portions of the test were not comparable. While such an argument may have some pedagogical merit, it is not statistically sound. Unfortunately, however, the argument is a moot one, since this is, in fact the only conversion table that was forthcoming for reading. At this juncture, it may be useful to ask why a test of such limited comparability was selected in the first place. In order to evaluate ongoing programs in District , 1974 MAT Comprehension data were collected as the pretest and the 1975 New York City Reading Test Comprehension data served as posttest. This is all quite bizarre, in light of the fact that programs were not strictly comprehension programs. Is there no obligation to assess the remainder of the program as well? Was there no forethought in this direction when the instrument was selected?

With this additional complicative factor in mind, any interpretation of the following data must be made with more than the usual qualification attributed to this type of population and testing situation.

Data based upon the Reading Comprehension subtest of the New York City Reading Test were provided for 56,824 pupils tested from among a total count of 71,607 pupils treated. Table 45 below indicates by grade level and school type, the pretreatment rate of gain in grade equivalent units and the rate of gain at the conclusion of the Title I treatments. The 43,865 tested pupils in treatments where positive achievement results were detected accounted for 78 percent of the group data reported. This combined group of pupils had been achieving at

approximately a half of month gain per month of schooling previous to enrollment in Title I. During treatment, these pupils' average growth was at the same rate as the normal achiever. They attained 1 month's growth for each month in treatment, thereby arresting their previous trend toward falling further behind their more advantaged peers.

Table 45

Positive Achievement Results for
New York City Pupils on 1974-75 Citywide Reading Test

Treatment Type	Treated N Total	N Tested	Rate of Gain Without Title I	Rate of Gain With Title I
Public Schools, Grades 1-3	6,588	4,819	.403	.767
Public Schools, Grades 4-6	32,408	27,210	.496	1.006
Public Schools, Grades 7-9	16,665	11,670	.512	1.123
Nonpublic Schools, Grades 1-3	70	55	.429	1.000
Nonpublic Schools, Grades 4-6	125	111	.571	1.714
Total	55,856	43,865	.49	1.010

As the data in table 46 indicates, an additional 14,595 pupils were enrolled in treatments in which no positive difference was detected between the pupils' previous growth rates and growth rate during Title I activities.

Table 46

New York City Pupils in Treatments
Showing No Gain on Citywide Reading Test

Treatment Type	Total Pupils Treated	Total Pupils Tested
Public Schools, Grades 1-3	6,517	5,748
Public Schools, Grades 4-6	5,677	4,886
Public Schools, Grades 7-9	2,401	1,796
Total	14,595	12,430

Chapter X

MATHEMATICS ACHIEVEMENT FOR NEW YORK CITY PUPILS

A large number of New York City decentralized school districts made use of the annual citywide testing program conducted in the spring to evaluate Title I project effectiveness. In 1975, the Office of Educational Evaluation (OEE), the evaluation branch of the Central Board of Education of New York City which is responsible for the citywide testing program administered a new "secure" test as the New York City Mathematics Test. The previous spring OEE had administered the Metropolitan Achievement Test (MAT). The publisher made available conversion tables, transforming the New York City Test scores to MAT scores, in the area of computations only. A comparison of the total combined mathematics scores was not provided. Certain caution must be exercised when interpreting the test data resultant from a comparison of the New York City Mathematics Test and the Metropolitan Achievement Test. The following data and interpretation are presented below with this caveat in mind.

Test results were reported for 9,049 pupils originating from treatment groups serving 12,690 pupils. The group means indicated that positive achievement results were reported for 5,703 pupils (cf., table 47 below). The weighted pretreatment rate of gain for these pupils was .63 months gain per month of school experience (in grade equivalent units). The pupils increased their achievement to an average rate 1.39 months per month during Title I treatments. The target population was closing the gap between their achievement level and that of the normal students at a rate of .4 month for each month of treatment exposure.

Table 47

Positive Achievement Results for
New York City Pupils on 1974-75 Citywide Mathematics Test

Treatment Type	Total Pupils Treated	Total Pupils Tested	Pretreatment Rate of Gain Month/Month	Title I Rate of Gain Month/Month
Public Schools, Grades 1-3	337	287	.47	1.65
Public Schools, Grades 4-6	3,676	2,945	.70	1.42
Public Schools, Grades 7-9	1,634	1,374	.50	1.27
Nonpublic Schools, Grades 1-3	56	15	.60	1.50
Total:	5,703	4,621	.63	1.39

In addition to the positive data above, test results for another test group total of 3,862 pupils were reported from a treatment group total of 6,254 pupils for which no positive gains were attained on the New York City Mathematics Test. These data are included on table 48 below.

Table 48

New York City Pupils in Treatments
Showing No Gain on Citywide Mathematics Test,

Treatment Type	Total Pupils Treated	Total Pupils Tested
Public Schools, Grades 1-3	1,080	600
Public Schools, Grades 4-6	2,749	1,847
Public Schools, Grades 7-9	2,425	1,415
Total	6,254	3,862

Chapter XI

OMITTED ACHIEVEMENT DATA

Selected data reported by the districts were excluded from the achievement report based upon measurement requirements determined by the SEA. Although these exclusions may depress the impact of the report, the data were not included in the achievement section for the following reasons: (1) the duration of treatment was less than or equal to 3 months, (2) the pretest and posttest means indicated that the participant groups made no gain while receiving Title I services, (3) the score types reported were not convertible by the SEA to usable form (ie., grade equivalent units, percentile rank), or (4) the measurement devices administered were not comparable to the norm referenced tests that were analyzed. The excluded data accounted for more than 5,000 Upstate and 22,000 New York City participants reported by the districts.

Inappropriate Measures Employed

Treatments lasting 3 months or less were excluded from analysis since scores of these participant groups were considered to be the least reliable. The interpretation of the findings was also confounded by regression effects. Tables 49 and 50 include the participant distribution in short duration treatments for Upstate and New York City.

Table 49

Upstate Short Treatment Data

Subject Area	Grade Interval	Treated	Tested
Reading	1-3	208	200
	4-6	366	351
	7-9	270	188
	10-12	74	66
	Subtotal	918	805
Mathematics	1-3	10	6
	4-6	46	45
	7-9	672	481
	10-12	38	36
	Subtotal	766	568
TOTAL		1,684	1,373

Table 50

New York City Short Treatment Data

Subject Area	Grade Interval	Treated	Tested
Reading	Pre K	420	363
	1-3	1,323	970
	4-6	3,271	2,726
	7-9	3,680	2,897
	10-12	2,501	1,996
	Subtotal	11,195	8,952
Mathematics	1-3	1,054	738
	4-6	839	679
	7-9	3,969	3,072
	10-12	1,475	1,190
	Subtotal	7,337	5,679
Bilingual Reading	1-3	234	218
	4-6	121	121
	7-9	112	106
	10-12	85	67
	Subtotal	552	512
Bilingual Mathematics	1-3	160	160
	4-6	115	115
	7-9	111	110
	10-12	66	55
	Subtotal	452	440
English as a Second Language	1-3	100	100
	4-6	312	307
	7-9	148	136
	10-12	54	54
	Subtotal	614	597
TOTAL		20,150	16,180

Unsuccessful Efforts

Also omitted from the analyses were participant groups whose achievement without supplementary services was equal to or greater than their achievement during Title I treatment. This category included pupils whose predicted growth (based upon their historical educational progress) matched or exceeded the actual rate of improvement during treatment. Participants who made no advancement in percentile rank or actually decreased in rank were likewise omitted. Tables 51 and 52 indicate the distributions of unsuccessful groups of participants in Upstate and New York City districts.

Table 51

Upstate Test Data Indicating
Objectives Failed

Subject Area	Grade Interval	Treated	Tested
Reading	1-3	1,012	837
	4-6	52	40
	7-9	118	118
	10-12	20	20
	Subtotal	1,202	1,015
Mathematics	1-3	228	210
	4-6	79	66
	7-9	32	32
	Subtotal	339	308
Bilingual Reading	1-3	24	11
	4-6	212	105
	10-12	21	17
	Subtotal	257	133
Bilingual Mathematics	1-3	21	13
	Subtotal	21	13
TOTAL		1,819	1,469

Table 52

New York City Test Data Indicating
Objectives Failed

Subject Area	Grade Interval	Treated	Tested
Reading	1-3	670	472
	4-6	1,032	707
	7-9	421	197
	10-12	34	30
	Subtotal	2,157	1,406
Mathematics	K	846	585
	1-3	302	261
	4-6	826	649
	7-9	274	240
	Subtotal	2,248	1,735
Bilingual Reading	1-3	85	71
	4-6	196	122
	Subtotal	281	193
Bilingual Mathematics	1-3	76	54
	4-6	391	253
	7-9	608	537
	Subtotal	1,075	844
TOTAL		5,761	4,178

The data from 1,686 Upstate and 1,305 New York City-tested participants (out of treated groups of 1,919 and 1,462, respectively) were excluded since the reported score types (stanines, mental ages, etc.) from the testing devices were not convertible to the units used in the statewide aggregations.

Also excluded were measures for 6,599 Upstate and New York City tested participants (from 8,999 treated participants). These exclusions were a result of unauthorized test substitution or measures reported outside the priority areas. The total number of test scores excluded was 27,143 from a treatment base of 34,214 reported scores in the form of averages. The treatment group of 34,214 for whom data were excluded for measurement reasons represented 5 percent of all component participants. The treatment group for whom data were excluded because no growth beyond that expected in the absence of ESEA, Title I supplementary services represented 1 percent of the 653,607 component participants.

Chapter XII

Districts That Failed to Submit Properly Completed Evaluation Reports as of November 15, 1975

District Code	District Name	Allocation
04-30-11-75-001(S)[1/]	Randolph Children's Home	$ 8,976
05-11-01-75-001(S)	Port Byron	10,389
08-12-00-75-001	Norwich	139,406
09-03-01-75-001(S)	Beekmantown	15,468
26-04-01-75-001(S)	Gates-Chili	13,257
28-02-13-75-001(S)	Valley Stream USFD #13	12,643
28-02-51-75-001(S)	Valley Stream CHS	3,050
28-04-03-75-001(S)	Roslyn	15,183
28-05-02-75-001(S)	Syosset	9,500
28-05-03-75-001(S)	Locust Valley	7,183
28-06-15-75-001(S)	Jericho	17,438
31-05-00-75-001 (BE #51657)	NYC Decentralized District 5	66,327
33-14-0075-002(S)	NYC Decentralized District 14	485,968
33-23-00-75-002(S)	NYC Decentralized District 23	429,765
42-06-01-75-001	Fabius	14,893
44-19-03-75-001(S)	Tuxedo	3,474
48-04-04-75-001(S)	Garrison	1,311
57-30-01-75-001(S)	Wayland	12,220
58-04-05-75-001(S)	Half Hollow Hills	10,000
58-10-04-75-001	Fishers Island	1,015
59-13-02-75-001(S)	Livingston Manor	9,550
66-09-09-75-001	Pleasantville	3,117
	TOTAL:	$1,290,143

1/(S) = Summer activities accounting for $1.07 million (83%) of the unreported projects.

Chapter XIII

ACHIEVEMENT DATA FOR HANDICAPPED PUPILS SERVED UNDER TITLE I (PARTS A, B AND C)

In addition to the expenditures under other Federal funds specifically for handicapped youngsters, districts may elect to serve handicapped pupils under Parts A, B and C of PL 93-380. The numbers of youngsters served, distributed by affliction type and supplementary services received may be found on page 17 of Section I.

The most frequently provided service was reading remediation, wherein 15,408 pupils received supplemental services. In evaluation reports submitted by LEAs reading data were provided on 6,222 handicapped pupils. Data for slightly less than half of these pupils (2,671) who were tested was analyzed via the historical regression analysis applied to data from Title I pupils who were educationally disadvantaged only.[1/] This analysis is appropriate for only certain types of handicapped pupils. Data from students who are crippled, emotionally distrubed, learning disabled, or other health impaired may be analyzed via this method.

Reading

The data in table 53 provide a summary of these pupils' data as measured by norm referenced standardized reading achievement tests, distributed by grade level intervals, and reported in grade equivalent units. Given that most of the pupils were in 8 month treatments,

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1/ c.f., Chapter III on achievement data reduction.

or 98 percent were enrolled in successful treatments serving 3,466 pupils. Since handicapped populations frequently include pupils who have difficulty maintaining skill levels already acquired, growth on reading achievement tests may be interpreted as indicators of program success.

Table 53

Summary of Reading Data For
Handicapped Pupils 1974-75 Title I (Parts A, B and C)

Source of Data	Total Pupil Count	Pupils Tested
Treatments where significant differences were established	3,466	3,144
Treatments where significant differences were not established	109	77
Treatments where the data were of questionable reliability	499	151
TOTAL:	4,074	3,372

Mathematics

Handicapped pupils also received remediation in mathematics skill areas. As was the case with reading, the measurement of growth in mathematics on norm referenced devices may be appropriate to only certain kinds of handicapped youngsters. The data that were analyzed with predicted outcomes are presented in table 54 below. Based upon

the total subgroup's pretreatment growth rate was approximately .4 months per month in grade equivalents. During Title I treatment the participants gained dramatically, showing an approximate 1.6 months per month growth rate in grade equivalents. They were substantially lessening the gap between themselves and the normal achiever on standardized tests.

Table 54

Historical Regression Data As Measured
by Reading Achievement Data 1974-75
Title I (Parts A, B, and C) for Handicapped Pupils

Grade Interval	Total Number	Number Tested	Mean Pretest (G.E.)	Mean Predicted Posttest (G.E.)	Mean Posttest (G.E.)
Grades 1-3	109	108	1.8	2.4	3.4
Grades 4-6	537	533	2.7	3.0	4.7
Grades 7-9	991	767	3.2	3.4	4.8
Grades 10-12	350	247	4.7	5.0	5.3
Ungraded	684	651	2.5	2.8	3.3
Total	2,671	2,306	3.0	3.3	4.3

In addition to the pupils discussed above, reading data for another 3,372 pupils designated as handicapped were analyzed to determine whether statistically significant differences existed between pretest and posttest distributions. Table 55 summarizes the numbers of pupils in successful treatments ($p \leq .05$) as opposed to unsuccessful treatments. Among the pupils appropriately tested, 3,144 of 3,221,

the predicted posttests reported these pupils' average pretreatment rate of growth was .44 months per month grade equivalent units in mathematics. During the Title I treatments, the mean rate of growth for these pupils accelerated to 1.28 months per month, grade equivalent units. While receiving supplemental services, these pupils succeeded in closing the gap of math achievement between themselves and their normal classmates. The rate of growth nearly tripled during treatment.

Table 55

Historical Regression
Mathematics Achievement Data, 1974-75
Title I (Parts A, B, and C) for Handicapped Pupils

	Total N	Tested N	Mean Pretest (G.E.)	Mean Predicted Posttest (G.E.)	Mean Posttest (G.E.)
Grades 1-3	33	32	1.4	1.7	2.2
Grades 4-6	69	68	3.2	3.6	4.4
Grades 7-9	132	132	3.4	3.8	4.9
Grades 10-12	1	1	5.4	5.7	6.2
Ungraded	684	651	2.7	3.0	3.7
TOTAL:	919	884	2.8	3.1	3.7

In addition to the mathematics data described above, one set of data for 3,814 pupils with different handicaps receiving mathematics treatments was provided. The pretest means were compared to the posttest means and tested for statistical differences. Among

the 3,814 pupils treated, 2,993 were tested. Table 56 below provides a comparison of the number of pupils in successful treatments (where statistically significant differences were revealed) with those who did not demonstrate growth, as well as for those for whom test results cannot be ascertained due to measurement errors. Of the 2,268 pupils for whom reliable data were available, the means for 2,174 (96 percent) showed a gain on standardized tests. Title I provided services and materials during which these pupils gained needed mathematics skills, instead of simply maintaining skills or falling further behind the nonhandicapped norm population.

Table 56

Summary of Mathematics Data For
Handicapped Pupils 1974-75 Title I (Parts A, B and C)

Source of Data	Total Pupil Count	Pupils Tested
Treatments where significant differences were established	2,679	2,174
Treatments where significant differences were not established	116	94
Treatments where the data were of questionable reliability	1,019	725
TOTAL:	3,814	2,993

Speech

One of the largest groups treated among handicapped pupils in Title I projects was speech impaired. While speech therapy was not one of the three priority areas for Title I treatment, many educators consider correct language development to be a prerequisite to reading development (especially where phonetic skills are involved). Section I, page 17[1/] of this report showed approximately 6,000 pupils receiving speech therapy treatments. The largest of these treatments was the Speech Therapy Component of the Central Board of New York City's Nonpublic Schools Title I program. From a total of 3,305 pupils that received treatment under this component, 2,704 had matched pretest and posttest scores from the Photo Articulation Test. The results of these data indicate that statistically significant improvement in articulation skills occurred as measured by this device.

Eight upstate districts including Syracuse and Rochester provided speech therapy services. A variety of standardized test instruments were administered to evaluate the effectiveness of these treatments, although the Wepman Test of Auditory Discrimination and the Templin-Darley Test of Articulation were most frequently selected. A total of 1,054 pupils were administered pretest and posttests representing treatment populations totalling 1,632 pupils. Means for the 98 percent of the pupils tested indicated positive gains (statistically significant) between pretest and posttest administrations. Speech articulation skills of speech impaired Title I students improved across the treatment period.

1/ A separate document.

Bilingual Reading

A number of the handicapped pupils treated were also bilingual; i.e., students whose primary language was not English. The Central Board of New York City, Syracuse, and Central Islip funded projects for handicapped Hispanic Americans. New York City provided services for 642 pupils of which 564 were administered the Cooperative Inter American Test (CIA) Series, to assess Spanish reading achievement. The pretest to posttest comparison indicated gains ($p \leq .05$) in raw score points for all treatments. The same was true of the Central Islip project where all 202 enrolled pupils were tested with the CIA in Spanish. Again, comparison of the final achievement level with initial levels on this test indicated showed that the pupil's reading in Spanish improved.

The Syracuse project goal of increased English reading capacity was evaluated via the Nelson Reading Test, vocabulary and comprehension subtests. The data from 23 public school pupils (among 45 treated) showed over a year gain in grade equivalent units in both subtests. The gap between these junior high school pupils and the English-speaking norm group was reduced. The differences between pretest and posttest group means for

receiving bilingual instruction in English or Spanish reading were found to be statistically significant ($p \leq .05$). The target population advanced in skill acquisition.

Chapter XIV

ACHIEVEMENT DATA FOR NEGLECTED AND/OR DELINQUENT PUPILS[1/]

Title I funds from Parts A, B, and C were made available to institutions providing services for neglected and delinquent youth. The services funded under PL 93-380 primarily provided instruction in the priority areas of reading and mathematics. The following discussion summarizes achievement results in these subject areas separately for New York City and upstate institutions. Data for New York City are tabulated on tables and below.

In New York City, the Neglected and Delinquent pupils were provided supplemental instruction through the Central Board project administered by the Office of Special Education and Pupil Personnel Services. In 1974-75, local education program reports indicated that reading and/or math instruction was provided for 2,181 pupils in kindergarten grades through 12, during the regular school year, and 765 pupils during the summer in New York City institutions. The regular school year project was evaluated using the Metropolitan Achievement Test. Pretest and posttest data were available for 1,220 pupils in reading. The mean pretreatment rate of gain was 6.4 months per 10-month period in grade equivalent units. While participating in the Title I supplementary treatment, the pupils gained 8.55 months in grade equivalent units during the 8-month treatment.

This accelerated rate of gain indicates that these pupils had not only arrested their deterioration in reading, but were now closing the gap between themselves and the normal readers. In mathematics, the students gained a mean of 6.74 months in grade equivalent units during the 8-month treatment period, a rate of .84 month per month. The average pretreatment rate of growth had been .44 month per month of the school year.

1/ A separate fiscal 1974-75 report devoted entirely to neglected and delinquent participants and the achievement of pupils served by PL 93-380 and PL 89-750 as amended is available upon request from the State Education Department.

The pupils' rate of gain in math had nearly doubled, a rate substantially beyond the rate expected based upon their previous performance.

The summer treatment funded in New York City was evaluated via criterion referenced tests. In reading, across all grade levels, 72 percent of the pupils initially failed in objective areas of phonetics analysis, structural analysis, and comprehension (1,145 pupils of 1,594). Of these initial failures, 955 pupils (over 83 percent) went on to master the behavioral objectives in the reading skill areas. In mathematics, students were pretested primarily in the basic areas of numbers, operations, and applications, as well as for selected skills in geometry, measurement, and problem solving. On the pretests, 900 pupils of 1,127 (80 percent) failed on test items in these skills. Of the 900 pupils who initially failed, 780 (86 percent) went on to pass test items in these skill areas.

In a separate treatment funded for adolescents incarcerated at Riker's Island, the findings were only moderately encouraging. In reading, the 176 pupils tested (of 350 treated) showed significant gain in achievement growth, as tested on a standardized norm referenced measurement device.

Their pretreatment rate of gain had been .30 months ingrade equivalent units for each month of school year. During treatment their rate of gain improved to .54 per month, substantially more than would have been expected based upon their pretest scores, but not sufficient to close the gap between themselves and more advantaged learners. In mathematics, their pretreatment rate of gain had been .25 per month in grade equivalent units across a period of 8 months (a rate of approximately .72 months/month in grade equivalent units). While this does not represent a normal growth rate, it represents an acceleration of nearly three times these students' previous rate of learning.

Table 57

1974-75 Title I Reading Achievement Data, Neglected and Delinquent Pupils in New York City

Grade Level, School Type	Total N	Tested N	Pretest	Posttest Predicted	Posttest Actual
Grades 1-3, Public	140	124	2.2	2.5	2.7
Grades 4-6, Public	303	243	3.1	3.5	3.7
Grades 7-9, Public	706	556	4.1	4.8	5.2
Grades 10-12, Public	225	191	5.9	6.3	6.8
Grades 1-3, Nonpublic	46	39	2.1	2.4	2.6
Grades 4-6, Nonpublic	61	51	3.0	3.3	3.4
Grades 7-9, Nonpublic	12	11	4.4	4.8	5.2
Grades 10-12, Nonpublic	5	5	6.1	6.4	6.6
TOTAL	1,498	1,220	3.89	4.40	4.74

Table 58

1974-75 Title I Mathematics Achievement Data, Neglected and Delinquent Pupils in New York City

Grade Level, School Type	Total N	Tested N	Pretest	Posttest Predicted	Posttest Actual
Grades 1-3, Public	65	54	2.4	2.8	3.1
Grades 4-6, Public	173	150	3.3	3.8	4.1
Grades 7-9, Public	449	373	5.0	5.3	5.6
Grades 10-12, Public	187	169	6.0	6.3	6.7
Grades 1-3, Nonpublic	13	11	2.0	2.4	2.7
Grades 4-6, Nonpublic	19	16	3.8	4.3	4.5
Grades 7-9, Nonpublic	8	8	5.6	6.0	6.5
Grades 10-12, Nonpublic	4	4	6.0	6.4	6.7
TOTAL	918	785	4.68	5.04	5.27

Table 59

1974-75 Title I Reading Achievement Data
Neglected and Delinquent Pupils in Upstate Districts

	Total N	Tested N	Pretest	Posttest Predicted	Posttest Actual
60813 - 7 mo.	37	20	1.9	2.3	2.8
8 mo.	6	5	1.5	1.8	2.0
9 mo.	4	4	1.8	2.5	3.4
60814 - 7 mo.	56	47	2.9	3.2	4.0
8 mo.	114	44	3.6	4.0	4.6
9 mo.	77	64	2.6	2.9	3.6
60815 - 6 mo.	12	12	3.8	3.9	4.1
7 mo.	86	50	4.5	4.9	5.2
8 mo.	89	68	4.1	4.5	5.1
9 mo.	81	70	4.7	5.0	6.0
60816 - 7 mo.	35	12	6.4	6.8	7.9
8 mo.	38	35	7.1	7.7	8.4
9 mo.	227	157	5.5	6.0	6.7
TOTAL	862	588	4.37	4.79	5.47

Table 60

1974-75 Title I Mathematics Achievement Data,
Neglected and Delinquent Pupils in Upstate Districts

	Total N	Tested N	Pretest	Posttest Predicted	Posttest Actual
60913 - 7 mo.	27	11	2.2	2.5	3.6
9 mo.	9	9	2.5	3.1	3.7
60914 - 7 mo.	34	28	4.0	4.5	5.5
8 mo.	6	5	3.0	3.4	3.7
9 mo.	20	18	3.4	4.1	4.8
60915 - 6 mo.	12	12	4.5	4.8	5.1
7 mo.	76	41	5.1	5.5	6.1
9 mo.	44	33	4.9	5.4	6.1
60916 - 7 mo.	61	45	6.8	7.2	7.6
9 mo.	29	29	5.9	6.5	7.7
TOTAL	318	231	4.94	5.39	6.10

Achievement data from Upstate projects for neglected and delinquent pupils included 1,112 pretest and posttest matched scores. The reading data on 588 pupils for which grade equivalent scores were provided, indicated that the pretreatment rate of gain was .46 month in grade equivalent units for each month of the school year. During supplemental Title I treatment, these pupils gained at a rate of 1.22 months per grade equivalent unit. The mathematics data on 231 pupils provided in grade equivalents indicated a pretreatment rate of achievement was .61 months. Their rate during Title I supplementary treatment was 1.5 months/month as measured by standardized tests. In both reading and math, these data indicate that these pupils are closing the gap between themselves and pupils who progress at normal rates. Tables 57 through 60 provide distributions of test means in grade equivalents by months between testing and grade equivalents by months between testing and grade level intervals for reading and mathematics.